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Notes from the East African Herbarium: XII*

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NOTES ON AFRICAN CONVOLVULACEAE: V†

The account of the family *Convolvulaceae* for the 'Flora of Tropical East Africa' was practically finished in East Africa in 1958. Certain problems arose which were impossible to solve in Africa and completion was delayed. Whilst in England, I took the opportunity of working over all the East African material for a second time; this has meant the revision of several of my former opinions and, I regret, the changing of more names. A very large amount of fresh material becomes available every year and this naturally modifies one's views constantly.

HILDEBRANDTIA VATKE

This genus has not previously been mentioned in these 'Notes on African Convolvulaceae'. A considerable amount of material from East and North East Africa has been examined but no revision has been attempted, because further collections are necessary. It is important when collecting specimens of this genus to obtain *both* sexes and also fruits; until really adequate material is available a general revision is not feasible. Three or four species occur in the area of the 'Flora of Tropical East Africa'. The following key and condensed synopsis will perhaps help to indicate the problems which remain to be solved. There are several undescribed species known from Somalia but it would not be wise to describe them at this stage.

KEY TO THE SPECIES OF HILDEBRANDTIA OCCURRING IN EASTERN AFRICA

1. Flowers pentamerous; female flowers with three outer sepals accrescent in fruit, two inner sepals remaining minute 2
   Flowers tetramerous; female flowers with either all four sepals or only two accrescent in fruit 3

* Continued from K. B. 14: 352 (1960).

† Continued from K. B. 14: 342 (1960).

2. Leaves usually small, about 5–13 × 2–4 mm., glabrescent or with sparse adpressed hairs; fruiting sepals glabrescent; corolla 4–8 mm. long 1. *somalensis**

Leaves larger, rounded or retuse at the apex, about 9–17 × 3–3·5 mm. velvety with silvery-grey, ± adpressed indumentum; fruiting sepals silky; corolla about 8 mm. long . . . . . 2. *sericea*

3. All four sepals of female flowers accrescent in fruit but inner two much smaller than outer . . . . . 3. *sepalosa*

Only the two outer sepals of female flowers accrescent in fruit, inner pair remaining minute 4

4. Leaves and sepals covered with dense patent indumentum of ± golden hairs . . . . . 4. *villosa*

Leaves and sepals glabrescent or with sparse to dense adpressed indumentum 5

5. Leaves usually obovate-spathulate, 7–20 × 3·5–10 mm., glabrous or sparsely adpressed pubescent; male corolla 6–12·5 mm. long 5. *obcordata*

Leaves mostly small, 3–15 × 1·5–3 mm., obovate, closely adpressed sericeous, sepals adpressed pilose, rarely glabrous; male corolla about 6 mm. long . . . . . 6. *africana***

Spencer Moore (Journ. Bot. 37: 406 (1899)) divided the genus into two sections, *Leptopoda* with sepals rounded at the base, containing *H. africana* and *H. undulata* and *Pteropoda* with sepals decurrent at the base including *H. somalensis* and *H. obcordata*. This character varies on a single individual and is of no value. The characters of the numbers and accrescence of fruiting sepals are the only reliable ones. Roberty (Candollea 14: 23 (1952)) sinks *H. obcordata* and *H. sepalosa* into *H. africana*. The sinking of *H. obcordata* into *H. africana* is understandable since intermediates occur, as will be mentioned later, but *H. sepalosa* is entirely distinct from *H. africana*, even though the male plants are difficult to separate.

He also, however, erects a new genus, *Pterochlamys*, based on *H. somalensis*, which he places *after Cladostigma*, as if the latter were more closely allied to *Hildebrandtia*. This new genus is entirely unfounded. He is, however, probably correct in erecting a new subfamily for *Cladostigma* and *Hildebrandtia*, since they stand apart from the rest of the family.

Enumeration of species

1. **Hildebrandtia somalensis** *Peter* in Engl. & Prantl, Nat. Pflanzenfam. 4(3a): 20(1891); Engl. in Engl., Bot. Jahrb. 18: 87 (1893).

H. lyciopsis Chiov. in Collez. Bot. Stefanini-Paoli: 121 (1916).

Somaliland. Bohodle, *Glover & Gilliland* 1005 (EA). Descent of Mared Valley, *Glover & Gilliland* 767 (EA). 64 km. S. of Garoè, *Hemming* 1389 (EA). Boundary, 8° 37′N., 45° 9′E., *Gillett* 4799 (K).

Somalia. Uegit, *Popov* 1085 (EA). Baidoa, *Senni* 815 (FI). Sobanàlle to Usciàcca Guràn, *Paoli* 1021 (FI, type of *H. lyciopsis*).

Ethiopia. Ogaden, 6 km. S. of Scillave and 24 km. SSE. of Scillave, *Simmons* 213, 214 (EA).

Kenya. Northern Frontier Province, Dandu, *Gillett* 12772 (K).

* Including *H. lyciopsis* Chiov. which is merely a variant with slightly larger flowers.

** Including *H. undulata* S. Moore.

2. **H. sericea** *Hutch. & Bruce* in Bull. Misc. Inf. Kew 1941: 164 (1941).

Somaliland. Halin to Bihen, *Glover & Gilliland* 136 (EA, K). Boundary, 8° 58′N., 44° 15′E., *Gillett* 4098 (K, type).

Ethiopia. Ogaden, 19 km. S. of Durukhsi, *Hemming* 1452 (EA).

3. **H. sepalosa** *Rendle* in Fl. Trop. Afr. 4(2): 70 (1905).

Somaliland. Harradigit, *James & Thrupp* (K, type).

Ethiopia. Ogaden: Dagabur, *Ashall* DA9, DA22 & *Simmons* 17 (EA). Near Moyale, *Everard in E.A.H.* 11707 (EA).

Kenya. Northern Frontier Province: Ijara to Bura, *Bally* 2060 (EA, K); Lebugumbisso, *Joy Adamson* 106 (EA). Machakos District: Voi to Mtito Andei, *Thompson in C.M.* 17510 (EA); Tsavo, *Bally* 8689 (EA); Ndi to Tsavo, *Hildebrandt* 2600 (BM, type). Teita District: Voi, *Ossent* 10, 50, 54, 58, 97, & *in E.A.H.* 10956 (EA, K).

Tanganyika. Moshi District: Lake Chala, *Greenway* 4452 (EA). Lushoto District: Lassa Mountain, *Burtt* 5336, 5329 (K).

The males of this species are often almost impossible to distinguish from the males of *H. africana*. The latter usually has a denser indumentum but by no means always. The style and stigmas are usually just included in male flowers of *H. sepalosa* and just exserted in those of *H. africana*, *H. villosa* and *H. obcordata*. *Hildebrandt* 2600 is chosen as the lectotype out of the two syntypes.

4. **H. villosa** *Hutch. & Bruce* in Bull. Misc. Inf. Kew 1941: 165 (1941).

Somaliland. Erigavo, *Popov* 1206 (EA, K) (variety with small ♀ flowers). Dubar. *Gillett* 4770 (K, type), 4771 (K). Boundary Pillar, *Gillett* 4174 (K) (variety with obovate leaves 16 × 6 mm.).

Kenya. Northern Frontier Province: Dandu, *Gillett* 12672 (EA, K, PRE) (this is a form intermediate with *H. obcordata* S. Moore & *H. africana* Vatke having ♀ sepals more glabrescent).

5. **H. obcordata** *S. Moore* in Journ. Bot. 37: 406, t. 402, fig. A (1899).

Ethiopia. N. or NE. of Lake Rudolf, *Donaldson Smith* (BM, type); Lake Rudolf, *Wellby* (K).

Uganda. Karamoja District: Turkana Escarpment, *Wilson* 218 (EA, K) and Katikekele, *Wilson* 226, 448 (EA, K).

Kenya. Northern Frontier Province: Wajir and Isiolo, *Bally* 3733 (EA, K); near Marsabit, *Dale in Verdcourt* 2222 (EA, K, PRE); footslopes of Mt. Kulal, *Verdcourt* 2232 (EA, K, PRE, etc.) (two latter are variants with denser silky indumentum than usual, approaching *H. africana* but ♂ corolla large). Turkana District: Loya, *Popov* 1489 (EA); Lorengipe, *Hemming* 265 (EA, K); Turkana desert, *Pole Evans & Erens* 1554 (EA, K, PRE); 104 km. N. of Kapenguria, *Pole Evans & Erens* 1534 (EA, K, PRE).

6. **H. africana** *Vatke* in S.B.Ges. Naturf. Fr.Berlin 1876: 8 (1876); Journ. Bot. 14: 313 (1876) and in Monatsb. Akad. Berlin 1877: 865 (1877).

H. undulata S. Moore in Journ. Bot. 37: 406, t. 402, fig. B (1899).

Arabia. Pays Fodhli, *Deflers* 374, 499 (K) (variant needing further study).

Somaliland. Ahl Mountains, near Maid, *Hildebrandt* 1534 (♂), 1525 (♀) (BM, K, types). Upper Sheikh, *Godman* 201 & 202 (BM) (var. with silky hirsute ♀ sepals). Golis Range, *Drake-Brockman* 317 (K). Without locality *Lort Phillips* (BM, K, type of *H. undulata*). Erigavo, *Peck* 203 (EA).

Ethiopia. Wardere, *Ellis* 124 (K) (♀ flowers necessary for confirmation). Filtu, *Corradi* 8531 (FI).

Several sheets including *Bally* 9949 and *Collenette* 73 have not been determined as female plants are needed. *Goddard* 83, from 10° 12′N., 48° 55′E., is a variety of which more material is required. It has minute glabrescent leaves and glabrous sepals. *H. africana*, *H. villosa*, and *H. obcordata* may all prove to be variants of one species but until a great deal of additional observations have been made they are best kept separate. *H. undulata* is a form with glabrous ♀ sepals.

Forms needing study of further material

1. *Bally* 10904 (K) (Somaliland, Al Medu) is a small shrub 0·3 m. tall very like a *Seddera* in appearance but the stigmas are those of *Hildebrandtia*. The flowers are pentamerous and the leaves densely velvety. Three sepals are large and ovate and two small and lanceolate. It is not, I feel, a ♀ of *Bally* 11032 which is a ♂ from the same locality but is tetramerous.

2. *White* 90 (PRE) (Somaliland, Hargeisa) & *Bally* 11032 (K) (Somaliland, Al Medu) may represent a form of *H. sepalosa* but the leaves are very narrow (6 × 1·3–7 × 1·5 mm.) and hairy, somewhat similar to *H. africana*. Complete material is required.

3. *Paoli & Stefanini* 967 (FI) (Somalia, from Audinle to Berdale) and *Paoli & Stefanini* 1049 bis (FI) (Somalia, from Usciacca Guran to El Ure) represent a species near *H. africana* but differ in having more distinctly petiolate leaves. Chiovenda (1916) refers these to *H. sepalosa* Rendle but the leaves do not agree. Complete material of both sexes and fruits are required.

4. *Buscalioni* 539 (FI), (Harar–Dire Dawe) *Puccioni & Stefanini* 789 (874) (FI), (Migiurtini, Valley of Las Agin) *Puccioni & Stefanini* 725 (802) (FI) (Migiurtini, dintorni di Chunded) & *Puccioni & Stefanini* 753 (831) (FI) (Migiurtini, Valley of Bacba).

The latter three are referred to *H. obcordata* by Chiovenda (1929). These four specimens all have small, thick obovate leaves with the veins often conspicuous. If not a new species, they at least represent a distinct form of *H. africana* or *H. obcordata*.

Seddera Hochst.

Seddera saturejoïdes *Chiov.* in Fl. Somala 1: 228 (1929).

I have examined the type of this species through the kindness of the Curator of the Herbarium in Florence. The small sessile flowers with corollas about 4·5–5·5 mm. long, small leaves, and intricate habit show affinity with *S. latifolia* Hochst. & Steud. and the *S. spinescens* Peter group. This group of species needs careful revision and study in the field. Save for habit-characters, there are few differences between any members of the spinescent group, which in itself may be only a habit-form of *S. latifolia*. The so-called spines are only bare branch-tips and not true spines. Chiovenda's species has golden indumentum on the leaves, calyces and young stems and silvery indumentum on the older stems, in all cases closely adpressed.

Seddera pedunculata (*Balf. f.*) *Verdc.*, comb. nov.

Breweria pedunculata Balf. f. in Proc. Roy. Soc. Edinb. 12: 83 (1883) & in Trans. Roy. Soc. Edinb. 31: 193 (1888).

It is of interest to point out, now that the supposed endemism of so many plants first described from Socotra is being disproved, that the above species is almost certainly conspecific with *S. hallieri* Engl. & Pilger. Further material is needed from Socotra to verify this; if correct the epithet *pedunculata* is much the earlier.

Convolvulus L.

Convolvulus jefferyi *Verdc.* in Kew Bull. 12: 344 (1957).

This species is undoubtedly closely allied to *C. rhyniospermus* Choisy but quite distinct. A good deal of further material from Tanganyika, mostly collected by Mr. R. E. S. Tanner, shows that it is much more variable than was first thought from the Kenya material alone—particularly with regard to peduncle-length. The flower-heads are sometimes almost sessile.Klotzsch described (Peters, Reise Mossamb. Bot: 241 (1861)) *C. involucellatus* but later in the same work (corrigenda, p. 576) sank it into *C. rhyniospermus*; it seems likely, however, that his species described from Portuguese East Africa (Inhambane) is identical with the Tanganyika forms of my species and that he was in error when he sank it into *C. rhyniospermus*. The descriptions of the leaf-bases (subspathulate) and the inflorescence (few-flowered on short peduncles) fits this view. The type (as in the similar case of *Stictocardia multiflora* (Hall. f.) has been destroyed and no further material has been collected; until it has, it is perhaps best to use my name, rather than to question Klotzsch's views on his own species.

Tanganyika. Pangani District; Mwera, Langoni, *Tanner* 2338, 3585 (K); Msubugwe Forest, *Tanner* 2211, 2841 (EA, K).

The species is clearly a link between *Jacquemontia* and *Convolvulus* in its habit but the stigmas are filiform.

Merremia Hall. f.

Merremia medium (*L.*) *Hall. f.* in Engl., Bot. Jahrb. 16: 552 (1893); Verdc. in Kew Bull. 13: 186 (1958).

Mention should perhaps be made of the typification of this species. Linnaeus (Sp. Pl.: 156 (1753)) gives a description and also cites Rheede Hort. Mal. 11: 113, t. 55 (1692). The description exactly fits a specimen in the Linnaean Herbarium of the Linnean Society of London which agrees with the present interpretation of the species. The Rheede plate, however, as Choisy long ago pointed out (Mém. Soc. Phys. Hist. Nat. Genève 6: 482 (1834)), represents a quite different species and the Linnaean specimen (number 218.7) is chosen as the type).

Where this specimen came from is not known but Linnaeus gave the original locality as India; I have seen the species only from the Comoro Islands and the coastal region of East Africa. The plant depicted by Rheede is a form of *M. tridentata* (L.) Hall. f.

Stictocardia Hall. f.

I have considerably revised my previously published views on this genus in so far as the status of certain taxa are concerned. In Kew Bull. 13: 189 (1958) I considered that *S. beraviensis* (Vatke) Hall. f. and *S. laxiflora* (Baker)

Hall. f. were best regarded as subspecies of one species. The study of the original material and many new gatherings has convinced me that this is definitely wrong and that the two are distinct species despite certain specimens which show intermediate characters. The length of the peduncles is not the main distinguishing feature at all but the forest species *S. laxiflora* has a much larger more campanulate corolla. A great deal more material of *S. beraviensis* is required from Madagascar before it is certain that the mainland plant, at present referred to under the same name, is correctly understood. It may well be a subspecies. There is undoubtedly more than one species of the genus in Madagascar, judging by the very sparse material I have seen. *Ipomoea velutina* R. Br., which I previously suggested might be a synonym, is undoubtedly not at all related and the resemblance is only superficial.

Stictocardia macalusoi (*Mattei*) *Verdc.*, comb. nov.

Ipomoea macalusoi Mattei in Bull. Orto. Bot. Colon. Palermo 7: 106 (1908).
Stictocardia tiliifolia (Desr.) Hall. f. in Engl., Bot. Jahrb. 18: 159 (1893) subsp. *macalusoi* (Mattei) Verdc. in Webbia 13: 322 (1958).

When I first studied this taxon I thought it was a local variant of the very widespread *S. tiliifolia*. Dr. S. J. van Ooststroom, to whom I showed a cultivated specimen, also considered it to be that species. Further study of the still limited material convinces me that it must be raised to specific rank —the inflorescence, shape and colour of the corolla are different. It is peculiar that the East Coast of Africa should produce a distinct form allied to *S. tiliifolia*, a plant which is widespread in both the Old and New Worlds on sand dunes; this coast has, however, produced other similar endemics. The name I have employed may possibly not be the oldest; *S. multiflora* Hall. f. was described from Cabanira, Portuguese East Africa and until it is recollected no conclusions can be reached but it was said to have white flowers whereas *S. macalusoi* has vivid scarlet flowers. It is very interesting to note that Klotzsch at first considered that *S. multiflora* was a variety of *S. tiliifolia*. Peters' specimen, which is the foundation of the former species, was destroyed at Berlin during the War. If any specimens which might be considered topotypes of *S. multiflora* are in existence in any herbarium, I would very much like to examine them as soon as possible so that the name used in the Flora is final.

A further specimen of this species has come to hand very recently and is in ripe fruit which enables the capsule to be described; it is globose, straw-coloured, about 1·8 cm. in diameter; the seeds are subglobose, brown, shortly pubescent with brown hairs, 7 × 6 × 5 mm. In this specimen the leaves are shortly acuminate.

Somalia. Modun near Brava, 1°N., 44°E., on sandy ground, 65 m., 28 Dec. 1958, *Mooney* 7651 (EA, K): a climber with large showy red flowers.

Ipomoea L.

Ipomoea kotschyana *Choisy* in DC., Prodr. 9: 354 (1845).

I. laciniata Balf. f. in Proc. Roy. Soc. Edinb. 12: 82 (1883) and in Trans. Roy. Soc. Edinb. 31: 188 (1888).

Balfour's species described from Socotra is no more than a dwarf form of *I. kotschyana.*

I. fulvicaulis (*Choisy*) *Hall. f.* in Engl., Bot. Jahrb. 18: 128 (1893).

var. **heterocalyx** (*Schulze-Menz*) *Verdc.*, comb. nov.

I. heterocalyx Schulze-Menz in Notizbl. Bot. Gart. Berlin 14: 110 (1938); Verdc. in Kew Bull. 13: 202 (1958).

Further study has been made of various isotypes of Schulze-Menz's species and even in this single gathering the leaf-shape and calyx-lobe dimensions vary very much; I believe that this taxon too is only a variety of *I. fulvicaulis*. My previous very dubious identity of *I. ledermanni* Pilger with this plant is probably wrong. The description would fit *I. blepharophylla* Hall. f. better than any other species but the matter must be left until topotypes are available. Considerable material of a distinct West African subspecies of *I. fulvicaulis* is preserved at Kew and needs further study. The name *I. ledermannii* would definitely appear not to be applicable to this.

I. kassneri *Rendle* in Journ. Bot. 50: 254 (1 Aug. 1912) *non* Pilger (27 Aug. 1912).

Two specimens of a strange *Ipomoea* were sent to me for identification from Kew and proved to be this species. These had been named *I. asperifolia* Hall. f. by another authority, a species with which they have nothing at all in common. The flowers are subsessile in triads, rarely solitary, supported by a pair of bracts. I believe that the species is somewhat related to *I. involucrata* Beauv. but it occupies an isolated position.

Northern Rhodesia. Mufulira, in plateau woodland, 3 Jan. 1956, *Fanshawe* 2683 (EA, K): prostrate creeping herb with many shoots from a woody rootstock, flowers mauve- pink. Mpika, in woodland, 30 Jan. 1955, *Fanshawe* 1904 (EA, K): procumbent leafy flowering shoots up to 0·3 m. long from a woody rootstock; flowers pale mauve.

The holotype (*Kassner* 2410 from Katanga) is preserved at the British Museum (Nat. Hist.) and an isotype is at Kew.

The identity of Ipomoea maxima (Linn. f.) Sweet

I. maxima (*Linn. f.*) *Sweet*, Hort. Brit., ed. 2: 372 (1830)

Convolvulus maximus Linn. f., Suppl. Pl.: 137 (1781)

Whilst investigating the typification of all the Linnaean names associated with species occurring in East Africa it became evident that the above name had been misinterpreted; actually since its inception in 1781. It is not synonymous with *I. sepiaria* Roxb., a common species which occurs in India, Malaya and Africa, as has been assumed by van Ooststroom and many others. Actually this synonymy was doubted long ago by Vahl but all later writers have accepted it. Linnaeus filius gives a description and states definitely '*Flores* nondum vidi'; he cites 'Tiru-Tali. *Rheed. mal. v.* 11. *p.* 109. *t.* 53.' and '*Habitat* in Zeylona *König* 2|.' There is a specimen in the Linnaean Herbarium (number 218.22) which was prepared from a plant cultivated in the botanic garden at Uppsala in 1778 from seeds sent from Ceylon, probably by Koenig. This specimen is sterile and agrees in every particular with the description given by Linnaeus filius; it is not, however, the same as *I. sepiaria* but, so far as one can be certain of a sterile specimen, is *I. alba* L.

The name *maximus* would, in any case, be clearly more appropriate for that species since it can scarcely be applied to any of the organs of *I. sepiaria*. The younger Linnaeus' description does not fit the Rheede plate which undoubtedly does represent *I. sepiaria* and explains the subsequent confusion. By selecting this plate as the type of *Convolvulus maximus* one might preserve the nomenclature at present in use. It is probable that Linnaeus filius thought that his sterile specimen would grow into a plant resembling that depicted in the plate. I have, however, taken the advice of Dr. W. T. Stearn and chosen as the type the specimen on which the description is so obviously based. The problem does not end there; I have studied a large number of asiatic specimens of *I. sepiaria* in connection with the above problem and am certain that the African species *I. hellebarda* Hall. f. is not separable. On the whole the specimens referred to the latter name have larger flowers but similar specimens can be found in India. I at first thought that both *I. sepiaria* and *I. hellebarda* occurred in Africa (Kew Bull. 13: 209 (1958)) and also described a var. *sagittata* of the former (as *I. maxima* var. *sagittata*) but all are best considered to be variants of a single variable species having a wide distribution. *I. sepiaria* might be typified either by the excellent Roxburgh plate preserved at Kew (number 570) or by a specimen of Rottler's from Tranquebar, 1799, in the herbarium of J. E. Smith (306.56) at the Linnean Society. I have chosen the former as the lectotype. The synonymy of the species so far as Africa is concerned is as follows; I have seen the holotypes of all the names mentioned.

I. sepiaria *Roxb.*, Fl. Ind., ed. Carey & Wall. 2: 90 (1824).

Convolvulus diversifolius Schumach. & Thonn., Beskr. Guin. Pl.: 94 (1829).
Batatas abyssinica A. Rich., Tent. Fl. Abyss. 2: 64 (1851).
Ipomoea diversifolia (Schumach. & Thonn.) F. Didr. in Kjoeb. Vidensk. Meddel. 1854: 221 (1854).
I. britteniana Rendle in Journ. Bot. 34: 38 (1896).
I. homblei De Wild. in Bull. Jard. Bot. Brux. 5: 38 (1915).
I. maxima var. *sagittata* Verdc. in Kew Bull. 13: 209 (1958).
[*I. maxima* sensu auctt. mult., *non* (L.f.) Sweet].
[*I. sagittata* sensu Benth. in Hook., Niger Fl.: 467 (1849), *non* Lam. et al.].

I. sagittaefolia Burm. f., Fl. Ind. 50, t. 18, fig. 2 (1768), sometimes thought to be this species, is judging by the figure something quite different.

I. lapathifolia *Hall. f.* in Engl., Bot. Jahrb. 18: 142 (1893).

I. dasyclada Pilger in Engl., Bot. Jahrb. 41: 297 (1908).
I. intricata Pilger in Engl., Bot. Jahrb. 45: 221 (1910).
I. lapathifolia Hall. f. var. *dasyclada* (Pilger) Verdc. in Kew Bull. 13: 211 (1958).

Although the types of the above names when examined separately appear widely different I have concluded after considerable further study that only one species is involved and that even varietal names are not really necessary. If future workers need varietal names they are available. The leaves vary from linear to ovate, the ovate-leaved plants often being much coarser with broader blunter sepals.

I had retained *I. intricata* as a distinct species in my original draft for the Flora but have since seen a photograph of the holotype kindly sent to me from Lund. The actual specimen was burnt at Berlin.

var. **bussei** (*Pilger*) *Verdc.*, comb. nov.

I. bussei Pilger in Engl., Bot. Jahrb. 45: 220 (1910).

I may be wrong in retaining even this as a variety and it, too, might be better considered a mere variant not needing a name. The coarse toothing of the lower part of the leaves is very distinctive. Intermediates, such as *Migeod* 65 (BM) from Tanganyika, Tendaguru do occur. This also I had retained as a dubiously distinct species until I had seen a photograph of the holotype, also sent from Lund. The actual specimen was burnt at Berlin. Pilger can be completely excused for describing these species since the variation is much wider than one would ever expect after a perusal of limited material and having no intermediate specimens for examination.

I. welwitschii *Hall. f.* in Engl., Bot. Jahrb. 18: 146 (1893).

I. multinervia Verdc. in Kew Bull. 13: 212 (1958).

Despite the distinctive leaf-characters possessed by the specimens for which I erected this new name and despite the fact that several botanists to whom I showed the plants thought I was correct in considering them to belong to a new species, I now believe that they are only freak forms of *I. welwitschii*. The veining of the leaves is variable in that species; sometimes the veins are scarcely visible but in other specimens with broad leaves there are numerous visible veins. *I. multinervia* is a form with the veins condensed; further collecting is necessary to show if the name is worth keeping up at an infraspecific level. There are no other firm characters distinguishing it from *I. welwitschii* but further material of the form is required to confirm this decision.

I. irwinae *Verdc.* in Kew Bull. 13: 214 (1958).

Further material of this distinct species has been collected and certain additions can be made to the description:—

Capsule straw-coloured, 12 mm. long; sepals reflexed in fruit; seeds subglobose-trigonous, 4·5 mm. long and 4 mm. wide, covered with short brown pubescence and also with long silky tangled hairs 9 mm. long as in some other species of this group.

Some additional older specimens have also turned up:—

KENYA. Lamu and Witu to Mombasa, 1902. *Whyte* (BM).

TANGANYIKA. Pangani District: Msubugwe, by seasonal waterhole in thick dry evergreen forest, 60 m., 24 Aug. 1957, *Tanner* 3657 (K). Morogoro, 16 km. out on the Dar es Salaam road, in savannah, 480 m., July 1958, *Tweedie* 1592 (K): flowers pure bright mauve; Morogoro, 500 m., 7 June 1933, *Schlieben* 4017 (BM).

I. ticcopa *Verdc.* in Kew Bull. 13: 213 (1958).

PORTUGUESE EAST AFRICA. Beira, on sand-dunes, 7 July 1913, *Dummer* 71 (BM): flowers white.

The problem of Ipomoea pulchella auctt. non Roth

The small graceful species with seeds covered with long woolly hairs allied to *Ipomoea cairica* (L.) Sweet and often known by the above mentioned name, has been the subject of endless confusion. One of the main difficulties facing an African botanist is that the problem hinges on the interpretation of early Indian specimens which is rendered particularly difficult because of the free interchange of specimens and descriptions between the early Indian botanists such as Rottler, Roxburgh, Koenig, Heyne, etc. All of the names applied to this species seem to be invalid or inapplicable. These will be considered in order.

1. *I. pulchella* Roth, Nov. Pl. Sp.: 115 (1821).

The holotype of this species, if such existed, is not now available. Roth says that he obtained the specimens from Heyne '*sub nomine longiflori*'. The description mentions acute sepals and setaceous peduncles. There are no specimens under this name in the Wallich herbarium at Kew but some of the labels in this herbarium are known to be erroneous and copied wrongly. There are specimens from Heyne in the collection (under No. 1353) which are labelled *Convolvulus longifolius* or perhaps it is *C. tenuifolius*—the writing is difficult to read. These specimens are mentioned later; they are not the graceful species which occurs in Africa but a small-flowered form of *Ipomoea cairica* (L.) Sweet. The drawing of *I. pulchella* given by Wight, Ic. 1, t. 156 (1839) is clearly *I. cairica*.

2. *Convolvulus heptaphyllus* Rottl. & Willd. in Ges. Naturf. Fr. Neue Schr. 4: 196 (1803).

The actual description appears to be by Willdenow alone since it is in a section of the paper headed 'Anmerkungen von H. Prof. Willdenow'. The description reads as follows.—'C. heptaphyllus foliis digitatis foliolis quatuor linearilanceolatis, binis inferioribus bipartitis, pedunculis subunifloris caule glabri volubili' and was based on material collected in Madras at Marmelon by Rottler. There is a sheet at Kew which is at least in part an isotype of this species. There are 5 or 6 pieces on the sheet*, some small and sterile and from different sources. They appear to belong to two different species and Dr. A. D. J. Meeuse has mentioned this fact in his account, the specimen having been carefully examined by Mr. B. de Winter; I am, however, not at all convinced of this. One piece may be *I. pulchella* auctt; the peduncles are rather slender and straight; the other pieces are very similar indeed (as Meeuse mentions) to the African plant *I. hochstetteri* House emend. but are not actually that species since the sepals and probably the seeds are not in accord and the peduncles are stout.

Some separated seeds in a packet are covered with long woolly hairs and are almost certainly from the plant with stout peduncles. This plant is a small-flowered form of *I. cairica* (L.) Sweet. There is a letter from Rottler stating that part of *Wallich* 1353 is *Convolvulus heptaphyllus* Rottler and this sheet is the same form of *I. cairica*. Meeuse (Bothalia 6: 764 (1958)) has used the name *I. heptaphylla* (Rottl. & Willd.) Voigt for *I. pulchella* auctt., but this

* Two pieces from Heyne, a piece from Rottler's own herbarium with his own herbarium label mentioning Marmelon attached, a piece from Klein and possibly a piece from Roxburgh.

is based on an error as has been pointed out by Dr. W. T. Stearn (*in litt.*). The Voigt reference (Hort. Suburb. Calcutt. 360: 1845) reads:—

'33, *heptaphylla* (I. pulchella, *Roth.; nov. spec. p.* 115;—*Wight icon.* 1, *t.* 156;—G. Don . . . excl. Convolvulus dasyspermus, Spreng. and C. digitatus, Roxb.; . . .—Convolvulus bellus, *Spreng.*—C. heptaphyllus, *Roxb. H. B.* (1814) *p.* 14; *fl. ind.* 1, *p.* 480; . . . '

I. heptaphylla Voigt is therefore based on *Convolvulus heptaphyllus* Roxb. and not on *Convolvulus heptaphyllus* Rottl. & Willd. The synonymy given by Voigt is confused since Wight, Ic. 1: 156 represents an entirely different plant from *C. heptaphyllus* Roxb. which is fortunately easily typified. Incidentally Voigt synonymises *Convolvulus digitatus* Roxb. with *Ipomoea tuberculata* (Desr.) Roem. & Schultes (i.e. *I. cairica* (L.) Sweet). The epithet *heptaphyllus* Rottl. & Willd. cannot be used in *Ipomoea* since it gives rise to a later homonym; but moreover the name *I. heptaphylla* (Roxb.) Voigt is also illegitimate since its basinym, *Convolvulus heptaphyllus* Roxb., is a later homonym of *C. heptaphyllus* Rottl. & Willd.

3. *Convolvulus heptaphyllus* Roxb., Fl. Ind., ed. Carey & Wall. 2: 66 (1824) *non* Rottl. & Willd. (1803).

There is an excellent painting of this by Roxburgh himself (No. 1950 in the Kew collection) and I have chosen this as the lectotype of the species. This depicts very clearly a plant with slender spirally coiled peduncles and small flowers. There is nothing like this to be found on the sheets which might easily be accepted as the type of Roxburgh's species, e.g. *Wallich* 1353. The original description which appears in the 'Flora Indica' (copied unchanged from Roxburgh's own MS. Flora preserved at Kew) distinctly mentions spiral peduncles. The plant very obviously climbs by means of these. Roxburgh states that the specimens he drew was cultivated in the Calcutta Botanic Gardens and was presumably from India. I have seen no specimens from India myself in any collection—it may be a rare species or it may have been grown from imported seed. It seems unlikely that it could have been imported from Mexico at such an early date (see *I. spirale* House, p. 12). The African plant '*I. pulchella* auctt.' quite definitely never has peduncles which behave in this manner.

4. *I. radicans* Choisy in DC., Prodr. 9: 387 (1845).

I have not seen the type of this species but Hallier filius had little doubt that it is the slender-peduncled plant under consideration. The name was used earlier by Blume and is therefore not available whatever the plant may happen to be. Dr. W. T. Stearn believes it is probably *I. tenuifolia* (Vahl) Urban, but he intends to deal with Bertero's Jamaican collection as a whole in the future.

5. *I. gracillima* (Collett & Hemsl.) Prain in Journ. As. Soc. Bengal 63: 111 (1894) *non* Peter (1891).

I. palmata Forsk. var. *gracillima* Collett & Hemsl. in Journ. Linn. Soc. Bot. 28: 96 (1890).

This plant was described from Meiktila in Upper Burma and the Collett specimens on which it is based are at Kew. They are almost identical with

the East African species but once again the name is unfortunately pre-occupied. This Indian plant may be varietally distinct but further complete collections of all the Indian plants in this group need examining.

6. *I. spirale* House in Muhlenbergia 3: 40 (1907).

Both Dr. Meeuse and Dr. Stearn have suggested that this might be the correct name for the African plant. It was described from Mexico (Jacqui River, *Palmer* 24 (US)). The slender spirally coiled peduncles, obviously used for climbing, are quite unlike those of the African plant, as has been mentioned under *Convolvulus heptaphyllus* Roxb. (p. 11). It appears that the latter is the same as *I. spirale* despite the improbability of a Mexican plant occurring in India at such an early date. More material is needed from both countries. The name is given as *I. spiralis* in the 'Index Kewensis'.

Since no name is available for the African plant I am describing it as new and establishing a new type. There are some differences between the African and Indian plants and this appears to be the best course. I am indebted to Dr. Stearn for his advice on this point.

Ipomoea tenuipes *Verdc.*, sp. nov. affinis *I. hochstetteri** House emend., pedunculis et petiolis gracilioribus differt.

Herba perennis, glabra, caulibus gracilibus, scandentibus. *Internodia* 3–7 cm. longa. *Folia* pseudostipulata, ambitu rotundata, usque 4 cm. longa et 6 cm. lata, palmatilobata, lobis 5, ellipticis, apice obtusis, apiculatis, 1·2–4 cm. longis et 0·4–1 cm. latis, exterioribus bifidis; petioli 0·5–4·5 cm. longi. *Inflorescentiae* axillares, 1–7-florae, pedunculis 1·5–4·5 cm. longis, pedicellis gracilibus, non spiraliter tortis. *Sepala* elliptica vel suborbicularia, apice obtusa, mucronulata, 2–5 mm. longa et 1·3–2·5 mm. lata, leviter vel dense papillosa. *Corolla* infundibuliformis, roseo-purpurea vel purpurea, 8–17 mm. longa; tubus ± 3 mm. diam. limbus 1 cm. latus. *Capsula* globosa, 8 mm. in diam. *Semina* subglobosa, compressa, brunnea, 4–5·5 mm. longa, velutine pubescentia, margine pilis sericeis, 5–10 mm. longis ornata.

Tanganyika. Shinyanga, *Koritschoner* 2186 (EA). Masai District, about 1·5 km. N. of Kwakuchinja, amongst bushes and tall grass in valley grassland on black cotton soil, 1080 m., 22 July 1956, *Milne-Redhead & Taylor* 11194 (K, holotype, EA, isotype): twining herb to 2 m., stems dull reddish-purple; leaves green above, paler beneath; nerves raised above and beneath; calyx green tinged dull purplish, strongly papillose; corolla mauve with paler tube; stigma magenta; anthers pale pink; fruits greenish-white, purple-brown when ripe. Central Province, Lake Kimagai, 16 June 1937, *Hornby* 811 (EA, K): trailing plant with small dark mauve flowers, fairly rare in damp soil near top limit of lake. Singida, 1200 m., Sept. 1935, *Burtt* 5290 (EA, K).

Portuguese East Africa. Sul do Save, Guija, *Myre* 31 (LM, PRE); near Sabi River, Meringua's Kraal, *Chase* 2538 (SRGH).

Southern Rhodesia. Wankie, Deka River, *Eyles* 7968 (SRGH).

Angola. Near Coroca River, *Baum* 11 (COI).

Transvaal. Soutpansberg, Messina, *Young* s.n. (PRE). Letaba, the Gorge, *Smuts & Gillett* 3535 (PRE).

Meeuse (Bothalia 6: 764 (1958)) records the plant also from Tropical America, West Indies, and India. As pointed out earlier (p. 10) the plant does occur in India but the other records need confirming by comparison with African material.

* House originally spelt this '*hochsteri*'.

This species is related to *I. spirale* House and *Convolvulus heptaphyllus* Roxb. but the pedicels are not spirally twisted. It differs from *I. hochstetteri* House emend. by its finer peduncles and from *I. cairica* (L.) Sweet in its much smaller flowers.

A small-flowered form of *I. cairica* (L.) Sweet has been mentioned in this discussion and since it occurs in Africa as well as in India more must be said about it. It is much confused with *I. hochstetteri* House and more work in the field is needed on these two forms; the seeds of the latter less often have long silky hairs on the edges, in fact the seeds of the type-specimens are glabrous. Some southern African specimens might, however, be placed under either name with equal ease.

I. cairica (*L.*) *Sweet* var. **indica** *Hall. f.* in Ann. Ist. Bot. Roma 7: 231 (1898).

I. palmata Forsk. var. *indica* (Hall. f.) Rendle in Fl. Trop. Afr. 4(2): 179 (1905).

Rendle states that the corolla is about 1 inch long and cites an Edith Cole specimen from Somaliland. Hallier filius gives the following synonymy—*Convolvulus digitatus* Roxb., *C. heptaphyllus* Wall., Cat. 1353 *non* Roxb. and *Ipomoea pulchella* Wight, Ic. 1: 156. He thus clearly understood that *C. heptaphyllus* Roxb. was a distinctive plant. The Wallich sheet is, as I have stated, a small-flowered *I. cairica*; the seeds have long hairs at the edge. The Roxburgh painting (No. 566), written up in his own hand and preserved at Kew, is chosen as the lectotype of *Convolvulus digitatus* and of Hallier filius's variety; it depicts *Ipomoea cairica* with somewhat smaller flowers than usual. The Wight drawing depicts rather typical *I. cairica*. *Gillett* 12648 from Dandu in the Northern Frontier Province of Kenya is this variety and is a good match of *Wallich* 1353 which among many other labels bears the name *C. digitatus* Roxb. *Wilson* 605 from the Karamoja District of Uganda also appears to be this variety.

To sum up there seem to be four species involved.

1. *I. tenuipes* Verdc. occurs in Africa and India and probably elsewhere. The names *I. radicans* Choisy and *I. gracillima* (Collett & Hemsl.) Prain refer to it but are not valid. *C. heptaphyllus* Rottl. & Willd. may refer in part to this species.

2. *I. hochstetteri* House emend. This appears to be confined to Africa but is so similar to some small-flowered forms of *I. cairica* (L.) Sweet that I would not like to deny the statements that it occurs in India which have been published.

3. *I. spirale* House. This is very distinctive on account of its spiral peduncles, which are very fine. *C. heptaphyllus* Roxb. *non* Rottl. & Willd. appears to be the same.

4. *I. cairica* (L.) Sweet var. *indica* Hall. f. occurs in India and Africa. *C. digitatus* Roxb., *C. heptaphyllus* Rottl. & Willd. and *I. pulchella* Roth probably all refer to this variety.

The Ipomoea trinervia group

I. trinervia *Schulze-Menz* in Notizbl. Bot. Gart. Berlin 14: 109 (1938).

This species (of which numerous isotypes have been seen) described from the south of Tanganyika* may be recorded from Nyasaland. A specimen has long rested at Kew amongst the indeterminate sheets. The species is an isolated one and I thought it might possibly not be African but this additional sheet indicates that it is indigenous. Its nearest affinity appears to be with *I. simonsiana* Rendle. The nervation of the sepals is similar in both species which seem to form an isolated group on their own. More adequate flowering and fruiting material is needed to draw up a description of this group.

Tanganyika. Newala, in cultivations on sand, 660 m., 15 May 1959, *W. Hay* 69 (K): semi-repent herb to 0·5 m.; flowers white.

Nyasaland. Lake Nyasa, Likoma Island, 1900, *W. P. Johnson* 48 (K).

I. simonsiana *Rendle* in Journ. Bot. 32: 178 (1894).

The following record is of interest:—

Southern Rhodesia. Zambezi Valley, Chirundu area, Urungwe, about 3 km. W. of the Rekomitjie Mission, in *Pterocarpus stevensonii–Commiphora* thicket on the road, 16 April 1958, *Goodier* 563 (K): slender creeper with white flowers.

The Ipomoea marmorata group

This group has been much misunderstood. In my first draft account for the Flora I included only two species but further work has indicated that there are probably four. The following synoptic table will serve to distinguish them. All have salver-shaped corollas with a frilly-edged limb which open mostly at night or in the morning; they have a sweet scent.

Plant a robust climber with stout perennial stems often attaining 9 m. in length and reaching to the tops of small trees; sepals 1·0–1·3 cm. long and 7–9 mm. wide; corolla tube 5·5–7·5 cm. long and (4–)6–9 mm. in diameter . . . . . 1. *lapidosa*

Plant a climber with perennial stems; sepals about 1·8 cm. long and 1·1–1·4 cm. wide; corolla tube 5–6 cm. long and 6 mm. in diameter 2. *paolii*

Plant a subshrubby herb, the stems mostly erect and probably dying back each year; sepals 1·6–2·3 cm. long and 0·8–1·6 cm. wide; corolla tube 8–10 cm. long and 6–13 mm. in diameter . . . . . 3. *marmorata*

Plant a subshrubby herb, the stems erect or decumbent, about 1 m. long, dying back each year; sepals 1·0–1·7 cm. long and 5–8 mm. wide; corolla tube slender (7·5–)9–11 cm. long and 3·5–4 mm. wide 4. *longituba*

In the past *I. longituba* Hall. f., which is the commonest and most widespread of the species, has been frequently misnamed *I. marmorata*. The type is unfortunately not to be found at Vienna and it appears that *Riva* 1437 & 1438 which were referred to *I. longituba* by Hallier filius† are not in fact that

* Whilst this paper was in the press a second gathering from Tanganyika was seen.

† Ann. Ist. Bot. Roma 7: 233 (1898).

species, a fact which misled me into assuming that *I. longituba* was a synonym of *I. marmorata* and using the name *I. lapidosa* Vatke for the plant which seems to be true *I. longituba*. True *I. lapidosa* Vatke is actually a very large liane quite unlike *I. longituba* in habit though often difficult to distinguish from poor, badly labelled herbarium specimens. I am indebted to Mr. P. R. O. Bally, whose first-hand knowledge of these plants in cultivation and in the field first made me doubt my interpretations. I have since seen *I. lapidosa* in the field myself and been impressed by its robust habit. Representative specimens of the plants are cited below.

1. **I. lapidosa** *Vatke* in Linnaea 43: 507 (1882); Baker & Rendle in F.T.A. 4(2): 190 (1905).

KENYA. Northern Frontier Province: Wamba, *Gardner in E.A.H.* 11299 (EA); Mathews Range, Kiquarr, *Joy Bally* 62 (EA); Barsaloi, *Jex Blake in C.M.* 9193. Machakos District: Kibwezi, *Irwin* s.n. (EA) & *Bally in C.M.* 7747 (EA, K); Mtoni River [Kibwezi R./Athi R. junction], 2° 19′S., 38° 7′E., *Kassner* 629 (BM, K); Mombasa–Nairobi road, 206 km. from Mombasa, *Verdcourt* 2394 (EA, K, PRE); Muka [Mukaa, 1° 5′S., 37° 19′E.] *Kassner* 935 (BM, K). Kitui/Machakos District: Athi River, 32 km. beyond Thika, 1440 m., *Bally* 4511 (EA, K) and cultivated in Nairobi from seeds from same plant, *Bally in E.A.H.* 11204 (EA).

The type, a unicate from Kitui (*Hildebrandt* 2760), was destroyed at Berlin. The record from near Mwanza (*Trotha* 112) needs confirming by recollection of material, as it is probably a misidentification. The selection of a neotype has been delayed until topotypic material is available. In this difficult group this seems the wisest course. I am grateful to Mr. J. B. Gillett for information about Kassner's localities for this species.

2. **I. paolii** *Chiov.* in Res. Scient. Miss. Stef.-Paoli, Le Collez. Bot. 124, t. 14 (1916).

SOMALIA. The four syntypes mentioned by Chiovenda have been examined. The specimen *Paoli* 8941 cited by Chiovenda is *Paoli* 894 according to the label.

KENYA. Northern Frontier Province: Ijara, *Greenway* in EA 11357 (EA); Bura to Ijara, 90 m. *Bally* 2062 (EA, K).

The two Kenya sheets had both tentatively been referred to *I. albivenia* (Lindl.) Sweet. Neither has a corolla but Bally's specimen is a good match of the authentic material and plate of *I. paolii* Chiov. Flowering material from the Ijara area is needed to confirm the determination. *I. incana* Chiov. (*loc. cit.* 123) of which the type has been examined is, most probably, merely a variety with densely velvety sepals.

3. **I. marmorata** *Britt. & Rendle* in Journ. Bot. 34: 36 (1896); Baker & Rendle in F.T.A. 4(2): 190 (1905).

This species appears to be separable into two subspecies; or they may finally turn out to be worthy of specific differentiation.

Leaves large, broadly reniform, very obtuse, sub-bullate with veins prominent beneath, tomentose and forming a reticulate pattern
subsp. *marmorata*

Leaves smaller, ovate-cordate, acute or acuminate at the apex, venation ± plane beneath . . . . . subsp. *somalica*

subsp. **marmorata**

Ethiopia. N. & S. of Mega Mountain, 1500 m., *Gillett* 15075 (EA, K); 24 km. S. of Negheli, 1340 m., *Mooney* 7359 (woolly variant). Lake Stefanie, *Donaldson Smith* s.n. (BM, holotype).

Kenya. Northern Frontier Province: Marsabit, 1200 m., *Meinertzhagen* s.n. (EA); *J. G. Williams in E.A.H.* 11061 (EA), *J. G. Williams* 9 (EA), *T. Adamson* 3 (EA), *Mrs. Adamson in Bally* 1824 (EA).

subsp. **somalica** *Verdc.*, subsp. nova affinis *I. marmoratae* subsp. *marmoratae*, foliis minoribus, non bullatis, apice acutis vel acuminatis, valde distincta; affinis *I. paolii* Chiov. ramis haud scandentibus differt.

Somaliland. Gan Libah, stony valley in limestone hills with *Acacia etbaica* and *Dodonaea viscosa*, 11 June 1958, *Hemming* 1339 (EA, holo.): bush to 0·9 m. with long tubular white flowers. Fodjar Escarpment, on rocky limestone plateau, 1770 m., *Bally* 9681 (EA): common straggly bush with tuberous root and whip-like branches, seed hairs brown. Badebato, 2 May 1945, *Glover & Gilliland* 1249 (EA, K): a white-flowered shrub, Ghoz, halfway between Burao and Hargeisa, 2 June 1949, 1050 m., *Bally* 7306 (EA, K): shrubby growth, root tuberous, flowers white with frilly margins.

4. **I. longituba** *Hall. f.* in Sitz. Akad. Wiss. Wien 107: 49 (1898); Baker & Rendle in F.T.A. 4(2): 191 (1905).

The type (Kenya, Athi Plains, *Pospischil*) has not been found; I am informed that it is not at Vienna where one would have expected it to be. Many specimens have, however, been seen from the Athi Plains.

Uganda. Karamoja District: Lodoketeminit Catchment, 57 km. S. of Moroto, 1290 m., *Kerfoot* 346A (EA) & *Kerfoot* 1307 (EA); Loyoro, 1380 m., *Wilson* 210 (EA); near Kotido, 1350 m., *Tweedie* 141 (EA); 23 km. S. of Kotido, *Dawkins* 638 (EA, K).

Kenya. Laikipia District: Rumuruti, 1800 m., *Napier* 1266 (EA, K), *Nattrass* H6/56–7. Machakos District: Kilima Kiu, *Jex Blake* 3056 (EA). Masai District: Magadi Road, *Mackenzie* 3210 (EA); 40 km. down old Kajiado road, *Bally* 754 (EA); Ngong Hills, *Bally in C.M.* 7513 (EA, K).

Tanganyika. Masai District: Oldoinyo Wasi, near Loliondo *G. R. Williams in E.A.H.* 11101 (EA); Ardai Plains, 1290 m., *Greenway* 7013 (EA, K); Ojorobar, *Hornby* H40/32/25 (EA). Arusha District: Oldoinyo Sambu to Ngare Nanyuki, km. 5, *Ivens* 189 (EA); Ngare Nairobi, 1380 m., *Fuggles Couchman* 114 (EA); *Sanders* 16 (EA, K). Central Province: Kilema, 1200 m., *Hornby* 2126 (EA). Between Arusha and Kilimanjaro, *Pole Evans & Erens* 1036 (EA, PRE).

The species described below has been known for many years from Zanzibar. The material available in the East African Herbarium had been much spoilt by insect damage before incorporation but duplicate material at Kew is in good condition. I first suspected that the specimens belonged to an introduced asiatic species but have found no reason to support this idea, nor any species in the collection of *Ipomoea* at Kew which in any way resembles them. Having already described two seemingly distinct species in the genus which have subsequently not satisfied me that they were really distinct, I feel hesitant to launch yet another new species! There seems to be no reason to suppose that it is not an undescribed species endemic to Zanzibar but one would not expect an endemic species of such a genus on that island. The plant obviously belongs near to the group *Poliothamnus* and is allied to *I. urbaniana* Hall. f. and to *I. flavivillosa* Schulze-Menz (which may, in any case be indumentum variants the one of the other).

Ipomoea zanzibarica *Verdc.*, sp. nov. affinis *I. flavivillosae* Schulze-Menz, sed sepalis latioribus differt.

Suffrutex scandens, ramis teretis, fistulosis, pilis setaceis appressis obtectis, *Folia* oblonga vel elliptico-rhomboidea, apice acuta vel aristata, basi angusta, rotundata, supra glabra, subtus pilis appressis obtecta, 7–15·5 cm. longa et 3·5–7 cm. lata; petioli ± 3 cm. longi, pilosi. *Inflorescentiae* axillares, pauciflorae, dense vel laxe cymosae, interdum ramosae; pedunculis primariis 9 cm. longis et pedunculis secundariis 0·5–5 cm. longis, bracteis linearibus vel spathulatis, apice acuminatis, 1·9 cm. longis et 0·5 cm. latis. *Sepala* lanceolata vel ovato-lanceolata, acuminata, 1·0–1·3 cm. longa et 3–5 mm. lata, exteriora angustiora, pilis appressis setaceis dense obtecta. *Corolla* infundibuliformis, alba vel purpurea, 5–5·5 cm. longa, fasciis mesopetalis leviter pilosis. *Capsula* ignota.

Zanzibar. Pangajuu, near cave-well, 10 June 1930, *J. H. Vaughan* 1346 (K, holotype, EA, isotype): herbaceous climber with profuse purple flowers, & same locality, 10 June 1930, *J. H. Vaughan* 1347 (EA, K): climber with white flowers. Ufufuma, fairly common on outskirts of forest, 22 June 1933, *J. H. Vaughan* 2116 (EA): climber with pink flower; ? same as Pangajuu plant [a very scrappy sheet which probably belongs here].

The Ipomoea argyrophylla group

Hallier filius, Rendle and I have all assumed that the plant described by Vatke from north-east Somaliland, *I. argyrophylla*, is conspecific with a very similar plant which occurs commonly in East Africa. Fruiting material of the latter has long been available, indicating that the seeds are covered with short, dark, adpressed pubescence. So similar are the two plants that I recently (Webbia 13: 326–7 (1958)) stated that 'the type and description of *I. argyrophylla* leave no doubt that the current interpretation of the species is correct' and described *I. somalensis* from plants having narrow woolly leaves and seeds covered with very long golden hairs. I had compared the type of *I. argyrophylla* with a large range of East African material before describing *I. somalensis* which indicates how similar the East African and Somaliland plants are in their foliage and flowers, the leaves of both being wide and having a short silvery indumentum. Mr. J. Newbould has, however, recently made some interesting collections along the route taken by J. Hildebrandt; one specimen (Northeast Somaliland, Shimber Beris, 1980 m., 31 July 1957, *Newbould* 760 (K)) is of great interest since it is *I. argyrophylla* from near the type locality and has wide leaves. It is the first fruiting specimen from the type area and the seeds are covered with long golden hairs. In foliage and flowers this specimen is extremely similar to East African material but such a range of seed indumentum is unlikely to exist in one species. The narrow-leaved plants which I described as *I. somalensis*, although strikingly different in appearance, are no more than a narrow-leaved dry country variant of *I. argyrophylla*. Mait, the type locality of the latter, is a wetter place than Erigavo and Sheik where the narrow-leaved plants grow. Another name is needed for the East African plant; the earliest available is *Rivea nana* Hall. f. (!) but the epithet *nana* unfortunately cannot be used in *Ipomoea* since it was employed by Collett & Hemsley in 1890. The next available name already at specific rank is *I. jaegeri* Pilger; unfortunately the type of this has been destroyed and Pilger makes no

obvious comparisons with other species but the description fits nothing but a rather large-leaved form of the East African plant previously confused with *I. argyrophylla*. The nomenclature of these species is therefore as follows:—

I. argyrophylla *Vatke* in Linnaea 43: 510 (1882).

Distribution: Somaliland.

I. argyrophylla *Vatke* var. **somalensis** (*Verdc.*) *Verdc.*, comb. nov.

I. somalensis Verdc. in Webbia 13: 327 (1958).

Distribution: Somaliland.

I. jaegeri *Pilger* in Engl., Bot. Jahrb. 45: 220 (1910).

Rivea nana Hall. f. in Engl., Bot. Jahrb. 18: 157 (1893).
Ipomoea argyrophylla Vatke var. *glabrescens* Hall. f. in Sitz. Akad. Wien Math. Nat. 107: 51 (1898); Baker & Rendle in Fl. Trop. Afr. 4(2): 195 (1906).
I. argyrophylla Vatke var. *brevisepala* Rendle in Fl. Trop. Afr. 4(2): 195 (1906).
[*I. argyrophylla sensu* Bak. & Rendle in Fl. Trop. Afr. 4(2): 195 (1906); Verdc. in Webbia 13: 326 (1958), *non* Vatke].

Distribution: Widespread in the Central and Southern Provinces of Kenya; Lake, Northern and Tanga Provinces of Tanganyika.

Mr. J. B. Gillett has collected a plant on Mega Mountain in southern Ethiopia which is probably *I. jaegeri* but fruiting material is necessary to confirm this*. It might be closer to *I. argyrophylla*. The fourth paragraph of my account on page 326 of my paper in Webbia 13 (1958) needs revising in the light of the above changes in nomenclature. *I. kituiensis* Vatke, *I. spathulata* Hall. f., *I. argyrophylla* Vatke and *I. cicatricosa* Baker all have seeds with long, patent, golden hairs, whereas *I. jaegeri* Pilger and *I. hildebrandtii* Vatke have seeds with short dark pubescence.

Turbina Raf.

Turbina perbella *Verdc.* in Webbia 13: 328 (1958).

A further specimen of this species has been collected recently.

Somaliland. Yafir, 10° 59′N., 48° 22′E., on bare limestone pavement on the top of the Al Medu, 1800 m., 6 Aug. 1957, *Newbould* 803 (K): occasional shrub with straight stems up to 1·5 m., lactiferous; Somali name 'Warabid'.

In this specimen the fruiting sepals are 2·2 cm. long and 8·5 mm. wide, and thinly sericeous. The capsule is hard, oblong-ellipsoidal, 1·3 cm. long and 5 mm. wide, pointed at the apex, slightly narrowed below, glabrous and rugulose. The seed is pubescent but adheres closely to the capsule. It appears that Hildebrandt did not collect this plant during his well-known expedition to the area.

* The Mega plant has now been confirmed as *I. jaegeri*.

Notes on *Millettia* Wight & Arn. in East Africa

J. B. Gillett

In the following account statements in the descriptions of new taxa which are based on specimens other than the holotype are enclosed in square brackets. Specimens believed to exist but not seen are indicated by an asterisk after the abbreviation for the herbarium concerned. Where material believed to have been derived from one plant individual has been made the basis for the description of a new taxon and subsequently sent to, or sent back to, more than one institution all the sheets are designated as holotypic. The term isotype is used for sheets with the same collector's number as the holotype which were not used in drawing up the description or which are thought not to have been derived from the same plant individual as the holotype. All specimens cited are at Kew unless otherwise indicated.

1. Species with glabrous corolla

The fruits and seeds of M. psilopetala Harms

This species, which occurs in central and eastern Congo Republic* and in SW. Uganda, is anomalous in having subalternate leaflets, a free vexillary stamen and no aril. The pod is described by Prof. L. Hauman (1954) as being flat, 12–15 cm. long, 2–3 cm. wide and containing 2–3 seeds which are subrectangular and c. 25 mm. long by 20 mm. wide by 5–6 mm. thick. Pods and seeds such as this are normal in *Millettia*. The only ripe fruits in the Kew Herbarium, however (those of *Eggeling* 3718, from Kalinzu Forest, Uganda) are turgid, over 2 cm. thick and contain 3–5 nearly cylindrical seeds which are 13–42 mm. long, 17–22 mm. wide and 15–20 mm. thick and closely pressed together at the ends. These fruits and seeds are quite unlike those of any other African species of *Millettia* and are presumably those described by Eggeling & Dale (1952) as 'pods swollen, seeds large'. *M. psilopetala* shows a good deal of variability in leaf-shape and -size, is described variously as a tree, shrub or liane, and in some instances has inflorescence-branches under 1 cm. and in others up to 7 cm. long. It thus seemed possible that two taxa might be involved. Thanks to the kindness of Prof. W. Robyns in loaning many sheets from the Jardin Botanique de l'Etat, Brussels it has been possible to examine a great deal of material but it has not been possible to correlate this variability in any way. However two sheets show packets of seeds which provide a clue to the mystery. In *Germain* 21 one seed is 7 mm. thick and in *Gille* 231 one is 10 mm. thick and another 13 mm. thick and almost cylindrical. In both cases other seeds are thin and flat as described by Prof. Hauman. It thus seems probable that the pods and seeds are flat when young but swell and become subcylindrical at maturity. The immature flat pods when dried dehisce (as often happens in the *Galegeae*) thus giving a false impression of maturity. It is desirable that this hypothesis should be tested by observation in the field, care being taken to obtain really mature fruits.

The extraordinary fruits and seeds of *M. psilopetala*, taken together with its

*"Congo Republic" in this paper refers to the former Belgian Congo.

other anomalous characters, throw doubt on its position as a *Millettia*. It has been described as a *Craibia* (*C. bequaertii*) on account of its alternate leaflets but its fruits and seeds are even more out of place there than in *Millettia*. The nature of the pods and seeds, as well as the subalternate leaflets suggest an affinity with *Angylocalyx*.

A possible new species related to M. psilopetala

A shrub resembling *M. psilopetala*, but the branches of the inflorescence are under 5 mm. long and each bear only 2–3 flowers, and the leaflets are strictly opposite. Mentioned here in the hope that someone may be able to secure flowers and fruit and thus make its description possible. No other *Millettia* with a glabrous corolla is known from Western Tanganyika.

Tanganyika. Western Province, Kigoma District: near Tubila railway station (c. 30° 8′E), on edge of evergreen forest, 1200 m., Nov. 1956, *J. Procter* 576 (EA, in bud).

A representative of the M. elskensii / M. duchesnei complex from eastern Tanganyika

Millettia puguënsis *Gillett*, sp. nov. *M. elskensii* De Wild. et *M. duchesnei* De Wild. proxima. A prima alis haud bi-auriculatis, a secunda floribus paulo maioribus, a duabus ruga callosa vexilli emarginata tantum, haud divisa, auriculis alaram et carinae brevioribus et ovario saepius 3-ovulato differt.

Frutex scandens; ramulis iuvenibus, ut rhaches foliorum, subfusco-pubescentibus. *Rhachis folii* ad 8 cm. longa, petiolo c. 4 cm. longo incluso, supra foliola lateralia c. 1 cm. prolongata; stipellae subulatae, c. 2 mm. longae; petioluli c. 3 mm. longi, pubescentes; foliola 2–3-jugata†, oblonga, ad 25 mm. lata et 11 cm. longa, acumine c. 1 cm. longo et prope apicem retusum 2–3 mm. lato incluso, superne subglabra subtus appresse haud dense strigosa, nervis pimariis utrinque c. 7, subtus fulvis, usque ad marginem haud attingentibus. *Inflorescentia* tota, ut calyces, dense fusco-sericea, pilis ad 0·8 mm. longis; flores in glomerulis bracteosis densis 3–6-floribus ad ramulos breves globosos 2–3 mm. diametro dispositi; glomeruli ipsi secundum rhachem vel simplicem et c. 30 cm. longum, vel ramosum, ramis ad 20 cm. longis et ad 50° patentibus, inaequaliter dispositi. Bracteae glomerulorum totorum mox caducae, haud visae; bractea flori cuiusque ovata, navicularis, ad 1 cm. longa, ut bracteolae oblanceolata 7–8 mm. longae ad basin calycis dispositae, ad anthesin persistens; pedicelli 3–4 mm. longi. *Calycis* tubus 4–5 mm. longus; dentes duo superiores in labrum ovatam 4 mm. longum, basin 4 mm., prope mediam 6 mm. latum, apice 1 mm. emarginatum coaliti; dentes alii ad anthesin imbricati, ovati, acuti, basin 3 mm., prope mediam 3·5 mm. lati, infimus c. 6 mm., laterales c. 5 mm. longi. *Corolla* glabra, purpurea. Vexilli lamina suborbicularis, emarginata, 15 mm. lata, 13 mm. longa, basin haud auriculata, ruga callosa transversale emarginata sed haud divisa 3·5 mm. lata 1 mm. alta obsita; unguis 4 mm. longus, basin 2, superne 3 mm. latus. Alae lamina suboblonga, 14 mm. longa, auriculo 1·8 mm. longo incluso, apicem versus 5 mm., basin 3 mm. lata, apice rotundato, basin ad latus auriculum oppositum paulo dilatata sed sine

† The specimen shows only the upper leaves: it is to be expected that the lower leaves will be considerably larger and probably up to 9-foliolate.

auriculo altero; unguis 5 mm. longus. Petali carinae lamina 11 mm. longa, 6 mm. lata, basin auriculo 0·8 mm. longo obsita; unguis 6 mm. longus. *Stamen* vexillare ad basin ipsem cum aliis arcte coalitum, deinde separatum sed non curvatum, deinde cum aliis leviter coalitum, superne iterum liberum, in toto 10–11 mm. longum. Staminorum aliorum pars connata 9–11 mm. longa, basin cum unguibus petalorum coalita, partes liberae 3–5 mm. longae, anthera 1·2 mm. longa. Discus nullus. *Ovarium* pubescens 3–5-ovulatum, c. 6 mm. longum, 1 mm. stipitatum; stylus 9 mm. longus, basin crassus pubescensque, ad mediam abrupte per 80–100° curvatus, superne glaber, ad apicem rectus; stigma terminale, discoideum, 0·4 mm. diametro. Legumen haud visum.

TANGANYIKA. Uzaramo District: Pugu Forest Reserve (c. 6° 52′S., 39° 5′E.), c. 100 m., June 1954, *Semsei* 1745 (K, holotype, EA, isotype).

This plant with *M. duchesnei* De Wild. and *M. elskensii* De Wild. forms a well-marked group of species remarkable for the flowers in dense glomeruli where the short pedicels are hidden by relatively large and persistent bracts and bracteoles, for the deeply divided calyx whose lobes are imbricate at anthesis, longer than the tube and wider near the middle than at the base, and for the glabrous corolla. The more tangible differences between the species are shown in Table 1. It will be seen that the differences are not great and that *M. puguënsis* resembles *M. duchesnei* in some respects and *M. elskensii* in others, while in others it differs from both. Some botanists might prefer to treat all three species as forms of a polymorphic *M. duchesnei*, especially as a var. *yangambiensis* of *M. elskensii* has been described which is said to be intermediate between that species and *M. duchesnei*. However it has been thought wiser here not to dispute the authoritative treatment of the

TABLE 1. Comparison of certain characters in α *Millettia puguënsis*, β *M. elskensii* and γ *M. duchesnei*. The values in α are based on the dissection of 4 flowers from *Semsei* 1745, those in β on 2 flowers from *Louis* 1409 and those in γ on 2 flowers from *Louis* 6546: the data in brackets are as given by Hauman in Fl. Congo Belg. 5: 13–15 (1954).

Character	α *puguënsis*	β *elskensii*	γ *duchesnei*
Length of largest calyx-lobe	6 mm.	6 (6–10) mm.	5 mm. (4–5 mm.)
Width of top of claw of standard	3 mm.	3 (2·5) mm.	2 mm.
Width of blade of standard	15 mm.	15 (16) mm.	13 (14) mm.
Callosity at base of lamina of standard	single, transverse, emarginate	divided into two by a deep cleft down the middle	
Auricle at base of standard	nil	0·8 mm. long	nil
Length of (main) auricle on wing	1·8 mm.	2·4 mm.	2·3 mm.
Small second auricle on wing	absent	present	absent
Length of auricle of keel ..	1·2 mm.	2 mm.	1·6 mm.
No. of ovules	3 (3 flrs.) 5 (1 flr.)	8 (8)	5 (5)

Congo species by Prof. Hauman and to keep *M. duchesnei* and *M. elskensii* as separate species, which can only be done by treating *M. puguënsis* as distinct. This conclusion is perhaps more acceptable in view of its geographical isolation from the other two species which are confined to the equatorial forest region of the Congo Republic and the Cameroons.

Section Efulgentes Dunn: a new species from Lake Albert

Millettia lacus-alberti *Gillett*, sp. nov.

M. possibly *M. lucens* (Scott Elliot) Dunn; Bak.f., Leg. Trop. Afr.: 225 (1929); Eggeling & Dale, Indig. Trees Uganda, ed. 2: 308 (1952).

Species *M. lucenti* (Scott Elliot) Dunn et *M. bipindensi* Harms affinis sed ut infra distinguiter.

	α *M. bipindensis*	β *M. lacus-alberti*	γ *M. lucens*
Foliola ..	6–8-jugata	4–6-jugata	4–6-jugata
Foliola ..	ad 7 cm. longa	ad 12 cm. longa	ad 8 cm. longa
Foliolorum indumentum	dense, subcupreonitens	minus dense	densissimum, argyronitens
Stipellae ..	saepe adsunt.	desunt.	saepe adsunt
Pedicellus ..	1—2 mm. longus	0	0
Bracteae ..	desunt vel caducissimae (haud visae)	c. 1 mm. longae, subpersistentes	ut in β
Bracteolae ..	1·5–2·5 mm. longae	1–1·5 mm.	1–1·5 mm.
Styli pars inferior recta	½ appresse pubescens, ½ glabra	omnino appresse pubescens	omnino patente pubescens
Styli pars superior curvata	omnino glabra	majore parte glabra	majore parte patente pubescens, per 2mm. infra apicem glabra
Legumen ..	oblongum (suturis parallelis); ad 15 mm. latum	haud oblongum, sutura superiore subrecta, inferiore curvata, ad 20 mm. latum.	haud cognitum.

Frutex scandens vel subscandens, ramulis griseo-atris, pubescentibus, lenticellis albidis ellipticis obsitis. Stipulae caducae, haud visae. Gemmae ovoideae, breves, pubescentes, superne apertae. *Folii* rhachis albo-pubescens, ad 17 cm. longa, petiolo 3–5 cm. longo incluso, supra foliola lateralia c. 1 cm. prolongata; stipellae 0; petioluli albo-pubescentes c. 3 mm. longi; foliola 5–6-jugata, lanceolata vel oblonga vel oblanceolata, basin breviter cuneata, apice sensim acuminata, superne glabra venis reticulatis prominentibus, infra viridia indumento nitente appresso argyreo subdense obtecta, ad 12 cm. longa et 3·6 cm. lata, nervis primariis utrinque 9–12 ad marginem haud attingentibus. *Paniculae* axillares et terminales dense fulvo pubescentes ad 17 cm. longae, ramis lateralibus multis, ad 6 cm. longis, flores sessiles oppositos

multos ferentibus, internodiis 3–6 mm. longis; bracteae ovales, ad 1 mm. longae, subpersistentes; bracteolae ovales, 1–1·5 mm. longae, persistentes. *Calyx* campanulatus castaneo-nitens appresse pubescens, tubo 2·5 mm. longo, dentibus triangularibus 3–3·5 mm. longis, duobus superioribus coalitis 0·5 mm. excepto. *Corolla* glabra, in vivo alba, vexilli basi viridelutea excepta, in sicco brunnea. Vexilli lamina obovata, 9 mm. longa, 7 mm. lata, basin auriculata et ruga transversa corrugata callosa obsita; unguis 2·5 mm. longus. Alae lamina oblonga, paulo falcata 8·5 mm. longa, 2 mm. lata, basin et auriculo acuto hamato et latere alio acumine parvo obsita; unguis 2 mm. longus, basin filamenta adnatus. Carinae unguis 3 mm., auriculus 1 mm. longus; lamina infra rotundata, latere saccata, 7·5 mm. longa, 3·5 mm. lata. *Stamen* vexillare basin incrassatum liberumque, deinde cum aliis coalitum; filamentorum aliorum pars connata 7·5–9·5 mm., partes liberae 4–4·5 mm., antherae 0·7 mm. longae. *Discus* parvus, profunde 10-lobatus. *Ovarium* tomentosum, 4-ovulatum, 0·5 mm. stipitatum, 3·5 mm. longum; styli pars inferior recta, appresse castaneo-pubescens, 4 mm. longa; pars superior majore parte glabra, c. 7 mm. longa, per 400° heliciter incurvata. [Legumen planum, castaneo-tomentosum, apice rostro ascendente obsitum, dorso recto, ventro aequaliter curvato, c. 7 cm. longum, ad 2 cm. latum.]

Congo Republic. Lake Albert, Legrelle fishery, beach with sand and pebbles, then forest on a steep slope, immediately behind the pebble zone, somewhat climbing shrub, calyx dark reddish brown, corolla white, base of standard greenish yellow, 5 Aug. 1953, *D. Van der Ben* 686 (BM, EA, K, all holotypic, BR, not seen, isotype).

Uganda. Bunyoro District: Waki river a few km. from Lake Albert (c. 1° 46′N., 31° 22′E.), 720 m., climber, 26 Dec. 1905 (in fruit), *A. G. Bagshawe* 856 (BM).

The species most closely related to *M. lacus-alberti* are *M. lucens* (Scott Elliot) Dunn and *M. bipindensis* Harms. The former occurs in Sierra Leone and Liberia, the latter from the Cameroons to the north-central part of the Congo Republic.

2. Species with corolla not glabrous: standard, and sometimes other petals, silky or pubescent outside

Section Compresso-gemmatae Dunn: a new species from Portuguese East Africa

Millettia mossambicensis *Gillett*, sp. nov. *M. sacleuxii* Dunn subaffinis; floribus multo minoribus, legumineque velutino, dimidio breviore, differt.

Arbor 3–7 m. alta; ramis griseis, deinde atratis, lenticellis ellipticis obsitis; ramulis novellis fusco-pubescentibus. *Stipulae* caducissimae. *Gemmae* compresso-conicae, fusco-pubescentes, squamis naviformibus. *Folii* rhachis fusco-pubescens, ad 15 cm. longa, petiolo ad 5 cm. longo incluso, supra foliola lateralia 1–3 cm. prolongata; stipellae filiformes, 2–4 mm. longae; petioluli fusco-pubescentes, 3–4 mm. longi; foliola 3-rarius 2-vel 4-jugata, basalia ovata, superiora elliptica, acuminata, apice mucrone caduco filiforme 1–2 mm. longo praedita, superne iuventute appresse minute albo-pubescentia, demum glabrescentia, infra longius densiusque subsericea, pilis 0·5 mm. longis, nervis marginibusque brunneis, ad 11 cm. longa et 7 cm. lata, nervis primariis infra prominentibus, utrinque 8–10, ad marginem attingentibus vel saepius fere attingentibus. *Paniculae* terminales, 4–12-florae,

brunneo-pubescentes, foliis breviores, ramis ad 15 mm. longis supra insertionem pedicellorum filiforme productis; pedicelli c. 10 mm. longi; bracteae bracteolaeque caducissimae, haud visae. *Calyx* rubro-fusco-sericeus, tubo 3–4 mm. longo; lobi oblongo-triangularii, c. 5 mm. longi, duo superiores fere omnino coaliti. *Vexillum* extus albo-sericeum; lamina 12 mm. longa, 17 mm. lata, basin nec rugosa, nec appendiculata, nec auriculata; unguis 1·5 mm. longus, 2 mm. latus. *Ala* apicem versus pilis paucis obsita; lamina 7 mm. lata, 14 mm. longa, auriculo hamato 1·5 mm. longo incluso; unguis 2 mm. longus. *Carinae* lamina glabra, 6 mm. lata, 12 mm. longa, auriculo 2 mm. longo incluso; unguis 2 mm. longus. *Stamen* vexillare liberum; staminum aliorum partes connatae c. 10 mm., partes liberae 3–4 mm., antherae 1 mm. longae. *Discus* minutus, annulatus, crenatus. *Ovarium* sericeum, 5 mm. longum, 4-ovulatum; stylus 12 mm. longus, basin sericeus, superne glaber, paulo supra mediam per 100° curvatus, apice rectus; stigma minutum, erectum. *Legumen* planum, oblanceolatum, dense velutinum, fusco-flavum, 1–2-spermum, ad 7·5 [12] cm. longum et 2·5 [3] cm. latum. [Semina elliptico-oblonga, ad axem leguminis transversalia, c. 15 × 10 × 4 mm., hilo terminale, carunculo annulare in ligulam producto, funiculo haud dilatato.]

Portuguese East Africa.† Manica e Sofala Province: Gorongosa District, Gorongosa game reserve, woodland, 90 m., slender tree 5 m. tall, corolla blue-purple, 25 Sept. 1953, *N. C. Chase* 5078 (K, holotype, BM, SRGH*, isotypes). Niassa Province: Mossuril District, between Namialo and Monapo, woodland with *Adansonia*, *Sterculia*, *Acacia* etc. on red earth, c. 200 m., tree to 7 m., flowers purplish-blue, viscid, African name 'Naneruro', 16 Oct. 1948, *Barbosa in Mendonça* 2463 (BM, K, LISC*); Matibane, in fruit, 14 Aug. 1948, *Pedro & Pedrógão* 4791 (EA); Nacala District, Fernao Veloso, in fruit, 15 Aug. 1948, *Pedro & Pedrógão* 4803 (EA); Quissimanjulo, Janga Forest, sometimes abundant, bark used to make rope, 24 Oct. 1952, *Barbosa & Balsinhas* 5184; Mogincual District, Mogincual, in fruit, 26 July 1948, *Pedro & Pedrógão* 4678 (EA); Rio Metapa near Quixaxe, in fruit, 27 July 1948, *Pedro & Pedrógão* 4713 (EA) & tree 6–8 m. tall, in fruit 27 June 1948, *Missao Silvicola da Moçambique* 1250 (BM).

Like its nearest known relative, *M. sacleuxii* Dunn from Tanganyika, this conspicuous species seems to be very local. It is worth noticing that in *M. sacleuxii* the ovary of every flower among some 50 examined had been attacked by insects while of the two flowers of *M. mossambicensis* dissected one had been attacked.

While the relationship with *M. sacleuxii* is at once apparent when *M. mossambicensis* is in flower, it is readily confused with *M. bussei* Harms when in fruit. In this condition attention should be paid to lateral nerves usually not quite reaching the leaflet margin, the longer pedicels, pods less tapering towards the base and the funicle not dilated at the side towards the base of the fruit.

M. thonneri De Wild.: a correction

M. thonneri *De Wild.*, Etud. Fl. Bangala et l'Ubangui: 218, t. 1 (1911); Dunn in Journ. Linn. Soc., Bot. 41: 213 (1912); Bak. f., Leg. Trop. Afr.: 236 (1929); Hauman in Fl. Congo Belge 5: 22 (1954).

De Wildemann and successive authors have described this species as having a glabrous corolla. The three sheets of *Thonner* 268, the type number, at Kew show the standard pubescent near the tip through glabrous at the

† Where no altitude is given in the following citation, the locality is below 100 m.

base. *M. thonneri* appears to be much more closely related to *M. barteri* (Benth.) Dunn than to *M. psilopetala* with which it has usually been compared.

The status of M. goetzeana Harms

Millettia impressa *Harms* subsp. **goetzeana** (*Harms*) *Gillett*, stat. nov.

M. goetzeana Harms in Engl., Bot. Jahrb. 28: 404 (1900); Dunn in Journ. Linn. Soc., Bot. 41: 209 (1912); Bak. f., Leg. Trop. Afr.: 234 (1929); Brenan, Checklist trees & shrubs Tanganyika Territory: 432 (1949).

Harms, in a footnote to his description of *M. goetzeana*, states that it is very close to *M. impressa* Harms, a species known from Gaboon, Western Congo Republic and Angola, differing only in its slightly larger flowers and the less well-developed acuminate tips of the leaflets. Since that time additional material from south eastern Tanganyika and northern Portuguese East Africa has so reduced the gap between the types of Harms' two species as to make a subspecific distinction more appropriate.

Table 2. The diagnostic characters of the two subspecies of *M. impressa*.

Character	subsp. *impressa*	subsp. *goetzeana*
leaflet tip	broadly and bluntly acuminate	acuminate or rounded
length of standard ..	8·5–10 mm.	10–14 mm.
length of filament-sheath	7–9 mm.	8–11 mm.

Tanganyika. Uzaramo District (c. 7°S., 39°E.), *Goetze* 11 (K, isotype); Vikindu forest reserve, *Semsei* 1315; Dar es Salaam aerodrome, *J. H. Vaughan* 2505. Kilwa District: *Kirk* s.n. Lindi District: Lutamba Lake, *Schlieben* 5288 (BM, K).

Portuguese East Africa. Cabo Delgada, Nangade-Palma (c. 10° 50′S., 40°E.), *Mendonça* 997.

Section Sericanthae Dunn redefined

Dunn (1912) describes a large section *Sericanthae* which he defines as follows. 'Arbores vel frutices erecti. Foliola stipellata vel exstipellata. Racemi axillares. Flores in nodos fasciculati. Petala sericea. Vexillum exauriculatum. Discus saepius annularis.'

Two of the species placed by Dunn in this section, *M. leucantha* Vatke and *M. lasiantha* Dunn, prove to be lianes and are thus better placed in §*Afroscandentes* Dunn. The type species of the section, *M. sericantha* Harms, together with *M. bussei* Harms and a new species *M. semseii* described below differ from other species of *Millettia* in which the standard is not glabrous in having the style-tip sharply bent inwards so that the stigma faces downwards. An incurved style-tip is also found in several species of §*Efulgences*, for instance, in *M. lucens*, *M. bipindensis* and *M. lacus-alberti* but in them, instead of only the very tip of the style being abruptly incurved, as in *M. sericantha*, the whole upper part of the style is gradually curved, often through 360°, so that the tip once more faces upwards. The style-tip may also be incurved in young buds of other species besides those mentioned, although straight in the mature flower. In view of the import-

ance usually given to the style-tip in taxonomy the uncinate style-tips of *M. sericantha*, *M. bussei* and *M. semseii*, supported as it is by other characters, seems amply sufficient to warrant the redefinition of §*Sericanthae* Dunn to include these 3 species only for the present, the remaining species being placed in a new section **Berrebera** (*Hochst.*) *Gillett*, stat. nov., differing as follows:—

Table 3. The diagnostic characters of §*Sericanthae* and §*Berrebera*.

	§*Sericanthae* sensu stricto	§*Berrebera*
Style-tip	abruptly incurved	straight
Stigma	facing downwards	facing upwards
Stipellae	absent or minute and hidden in long hairs	usually present and clearly visible
No. of leaflets ..	5–9	usually more than 9
Main lateral nerves ..	running through to margin of leaflet	curving round or breaking up before margin is reached
Claws and auricles of alae and carina	more or less pubescent	glabrous (except in *M. thonningii*)
Ratio of length of calyx-teeth to that of calyx-tube	0·3–0·5	under 0·2

Section Sericanthae: a new species from Tanganyika

Millettia semseii *Gillett*, sp. nov. *M. sericanthae* Harms et *M. bussei* Harms affinis. Indumento breviore sparsiore, stipulis linearibus, floribus minoribus, bracteolis multo brevioribus differt.

Arbor ad 15 m. alta; ramuli iuvenes minute brunneo-pubescentes. *Folii* rhachis primo minute brunneo-pubescens, deinde glabrescens, ad 14 [18] cm. longa, petiolo ad 5 cm. longo incluso, supra foliola lateralia ad 13 mm. prolongata; stipulae lineares, c. 6 mm. longae, caducissimae; stipellae 0; petioluli minute pubescentes, 3–4 mm. longi; foliola 3–4-jugata, elliptico-oblonga, ad 11 cm. longa et 7 cm. lata, acumine c. 5 mm. longo praedita, superne, nervis exceptis, glabra, infra pubescentia, nervo mediano glabrescenti; nervis lateralibus utrinque 9–12, subtus fulvis, ad marginem attingentibus. *Pseudoracemus* sparse fusco-pubescens, ad 17 cm. longus, rhachi principale simplice vel interdum ramosa; ramuli laterales, quique flores 1–3 ferentes, c. 2 mm. longi, vel rarius basales ad 6 mm. longi; bracteae haud visae; bracteolae ad basin calycis, oblongae, 1–1·5 mm. longae, 0·5 mm. latae; pedicelli 3–4[–5] mm. longi. *Calyx* minute fusco-pubescens, tubo 3 mm. longo, dentibus apice rotundatis, c. 1 mm. longis, duobus superioribus fere ad apicem coalitis. *Vexilli* lamina quadrato-orbicularis. extus dense appresseque albo-sericea apice emarginata, basin haud auriculata, in longitudinem paulo calloso-rugosa, c. 10 mm. lata et longa; unguis dense pubescens, c. 3 mm. longus. *Alae* lamina suboblonga, c. 8 mm. longa et 3 mm. lata, breviter (0·5 mm.) auriculata, ad apicem basinque et praecipue ad auriculum pubescens; unguis 4·5 mm. longus, sparse pubescens.

Carinae lamina subtriangularia, apice obtusa, basin auriculata, 9 mm. longa, prope apicem, ad suturam et ad auriculum dense pubescens; unguis 4 mm. longus, superne pubescens. *Filamentum* vexillare prope basin liberum curvatumque, superne leviter ad alia adhaerens; filamentorum aliorum pars connata, 8–10 mm., partes liberae 3 4 mm., antherae 0·8 mm. longae basin pilis albis paucis praeditae. *Receptaculum* sectum succum lacteum exudens. *Discus* ad annulum ad basin filamentorum angustum lobatumque reductus. *Ovarium* sericeum 4–5 mm. longum, 8-ovulatum, 1–2 mm. stipitatum; stylus fere glaber, c. 7 mm. longus, ad mediam per 80° curvatus, ad apicem abrupte incurvatus, stigmate retrospiciente. *Legumen* fere maturum 4–7-spermum, glabrum, complanatum, margine incrassato, in sicco stramineo-brunneum, basin attenuatum, versus apicem latius, ad 17 cm. longum, 2·6 cm. latum, 3 mm. crassum. Semina haud visa.

Tanganyika. Morogoro District: Turiani, large tree on banks of Liwale river, Nguru name 'Mnemela', Nov. 1954, *S. R. Semsei* 1921 (K, holotype, EA, isotype). Turiani, fringing forest, 500 m., tree to 15 m. with large spreading crown overhanging the river-bank, in fruit only, pods pale green, 25 Mar. 1953, *Drummond & Hemsley* 1800 (fruit and mature leaves described from this specimen). Turiani & Mahonda, 600 m., alluvial forest, spreading tree up to 20 m. tall, in fruit 3 June 1933, *B.D Burtt* 4727 (BM).

This species is named after Mr. S. R. Semsei who first collected it in the flowering condition as well as the type of *M. puguënsis*. Mr. Semsei, by birth one of the Wabonda of Tanga Province, is a member of the Tanganyika Forestry Department. He is perhaps the first person of East African birth to make a large scientific collection of plants. His specimens are in the Tanganyika Forest Department Herbarium, Morogoro, the East African Herbarium, Nairobi and at Kew.

Section Berrebera (Hochst.) Gillett

Section **Berrebera** (*Hochst.*) *Gillett*, stat. nov.

Berrebera Hochst. in Flora 27: 100 (1844) & 29: 597 (1846), pro gen.
§*Sericanthae* Dunn in Journ. Linn. Soc., Bot. 41: 137 (1912), pro parte
Type species: *M. ferruginea* (Hochst.) Baker

Erect trees or shrubs. Leaflets usually more than 4-jugate; stipellae usually present; lateral veins of leaflets not reaching the margin. Inflorescence pseudo-racemose, the lateral branches reduced to mere knobs, or those near the base of the inflorescence may, rarely, be up to 2 cm. long. Calyx lobes rarely more than $\frac{1}{3}$ never more than $\frac{1}{2}$ as long as tube. Corolla purplish blue; standard silky outside; wings and keel often pubescent at the tip but their claws and auricles almost always glabrous; folds at base of standard weakly developed or absent. Vexillary filament free at the base, lightly attached above in the mature flower. Style-tip straight in the mature flower the stigma pointing upwards. Ovules 5–10. Funicle swollen at side towards pedicel. Seeds with a short hilar aril enlarged at one side into a strap-shaped process.

This section is one of the largest in Africa, especially outside the equatorial rainforest, and its members reach the highest altitudes (up to 2400 m.). It seems to be the section in which evolution is proceeding most rapidly, so that the delimitation of the species within it is most difficult. Many of the montane forested areas in East Africa have their own distinctive populations of the *M. eetveldeana-oblata–dura* complex which demand taxonomic recog-

nition of some kind but whether as species or subspecies is difficult to say. Besides the taxa recognised below *M. paucijuga* Harms, although anomalous in its few leaflets without stipels, may belong to this section but in the absence of fruit it is here omitted.

KEY TO THE SPECIES OF §BERREBERA FOUND IN, OR REPORTED FROM, EAST AFRICA.

Inflorescence-axis usually under 15 cm. long; most of the floriferous branches several mm. long, not reduced to mere knobs; mature pod usually tomentose (unknown in No. 3); leaflets 9–17:

Leaflets 9–13 or if 15–17 (in No. 2) rounded at the apex or with a broad blunt acuminate tip at least 3 mm. wide; hairs (except on pod) under 0·5 mm. long:

Filament-sheath c. 20 mm. long; pod c. 18 mm. wide; leaflets up to 10 cm. long with sparse appressed straight hairs, later glabrescent; inflorescence sparsely appressed brown-pubescent . 1. *elongatistyla*

Filament-sheath 10–13 mm. long; pod up to 11 mm. wide; leaflets up to 7·5 cm. long; hairs on lower surface of leaf either absent or soft and curved . . . . . 2. *usaramensis*

Leaflets almost glabrous below; inflorescence almost glabrous; calyx almost glabrous except at the margin; indumentum of pod usually mostly silvery . . . . . α subsp. *usaramensis*

Leaflets up to 7 cm.; filament-sheath 11–13 mm. long . . . . (1) var. *usaramensis*

Leaflets 2–3 cm.; filament-sheath c. 10 mm. long . . . . . (2) var. *parvifolia*

Leaf-rhachis, inflorescence and underside of leaflets pubescent; calyx appressed-pubescent; hairs on pod usually reddish; leaflets up to 7 cm.; filament-sheath 11–13 mm. long . . . β subsp. *australis*

Leaflets 15–17 with narrow (1–2 mm. wide) or pointed acuminate tips:

Acuminate tips of leaflets 1–2 mm. wide at apex, not pointed; hairs on lower surface, margins and nerves of young leaflets numerous, short, appressed, straight, golden; inflorescence and calyx shortly pubescent (hairs up to 0·3 mm. long-); filament-sheath 12–14 mm. long . . . . . 3. *schliebenii*

Acuminate tip of leaflets pointed; hairs on lower surface of leaflets and inflorescence dense, up to 0·9 mm. long; pod up to 19 mm. wide, densely yellowish-brown-tomentose . . . . . 4. *eriocarpa*

Inflorescence-axis usually over 15 cm. long (if shorter, filament-sheath over 15 mm. long) floriferous branches, or at least the upper ones reduced to mere knobs 1–2 mm. across; mature pods glabrescent; leaflets in several taxa often over 17 in number:

Blade of standard less than 17 mm. long; filament-sheath under 17 mm., pods under 14 cm. long:

Blade of standard longer than wide, less than 16 mm. wide; filament-sheath c. 15 mm. long:

Pedicels shorter than calyx; hairs on pedicel and calyx dense, very short (0·1–0·2 mm.) and appressed; lower corners of blade of standard prominent, rounded; disc present, collar-shaped; upper margin of keel ± concave . . . . . 5. *drastica*

Pedicels as long as, or longer than calyx; hairs on pedicels and calyx longer (up to 0·5 mm.) and more spreading; lower corners of blade and standard not well developed; disc absent; upper margin of keel ± straight . . . . . 6. *eetveldeana*

Blade of standard wider than long; blade of wing and keel less than twice as long as wide; claw of wing and keel more than half as long as blade; disc absent . . . . . 7. *oblata*

Standard less than 16, usually c. 14 mm. wide; calyx-teeth triangular or acuminate; filament-sheath c. 12 mm. long; hairs on pedicel c. 0·5 mm. long; leaflets 13–21; ovules 6–7; trees 5–30 m. tall:

Indumentum of leaflet-undersurface usually rather dense; hairs on midrib mostly spreading stiffly at right-angles; floriferous branches all reduced to knobs . . . . α subsp. *oblata*

Indumentum of leaflet-undersurface sparser; hairs on midrib appressed, or spreading at a small angle; lower floriferous branchlets up to 5 mm. long . . . . β subsp. *intermedia*

Standard more than 16 mm. wide; indumentum of leaflet-undersurface dense:

Leaflets 13–21; trees 5–23 m. tall:

Lower floriferous branches up to 15 mm. long; calyx-teeth acutely acuminate; ovules c. 9; filament-sheath c. 13 mm. long; hairs on pedicel rarely over 0·3 mm. . γ subsp. *stolzii*

All floriferous branches reduced to knobs; calyx-lobes broad, rounded at the tip; ovules c. 6; filament-sheath 15–16 mm. long; hairs on pedicel c. 0·5 mm. long . . δ subsp. *teitensis*

Leaflets 9–11; shrub 2–3 m. tall; lower floriferous branches up to 15 mm. long; filament-sheath 14–15 mm. long; ovules c. 8 ε subsp. *burttii*

Blade of standard more than 17 mm. long and 16 mm. wide; filament-sheath over 17 mm.; pods often over 14 cm. long:

Disc absent, or barely perceptible; indumentum of pedicel and calyx uneven, not truly velvety; bracteoles often well below the base of the calyx; pod under 25 mm. wide; blade of wing and keel more than twice as long as wide; leaflets up to 19 in number . 8. *dura*

Disc present, tubular, 1–1·5 mm. long; indumentum of pedicel and calyx dense, short and velvety; bracteoles closely appressed to calyx base; pod up to 30 mm. wide; blade of wing and keel less than twice as long as wide; leaflets up to 23 or 25 in number 9. *ferruginea*

Hairs on lower surface of leaflets copious, spreading, 0·5–0·6 mm. long; those on inflorescence and calyx golden brown; pedicel up to 9 mm., standard up to 23 mm., filament-sheath up to 18 mm. long . . . . . α subsp. *ferruginea*

Hairs on lower surface of leaflets sparse, appressed, 0·2–0·3 mm. long; those on inflorescence and calyx blackish brown; pedicel up to 12 mm. or more, standard 26–30 mm., filament-sheath 19–21 mm. long . . . . . β subsp. *darassana*

1. **Millettia elongatistyla** *Gillett*, sp. nov. *M. usaramensi* affinis: foliolis floribusque majoribus, stylo multo longiore supra mediam curvato, legumineque multo latiore differt.

Arbor ad 7 m. alta, ramulis tenuibus albo-punctatis fere glabris. *Stipulae* anguste triangulariae, 2–3 mm. longae, breviter brunneo-pubescentes. *Gemmae* parvae, late plano-ovatae, pubescentes. *Folii* rhachis iuventute sparsissime brunneo pubescens [demum glabrescens], ad 25 cm. longa, petiolo ad 11 cm. longo incluso, ultra foliola lateralia ad 2 cm. prolongata; stipellae filiformes ad 3 mm. longae; petioluli atri, sparse et breviter fusco-pubescentes, ad 3 mm. longi; foliola 5-, vel rarius 4-vel 6-, jugata, oblongo elliptica, inferiora ovata, basin late cuneata, versus acumen terminale attenuata, ad 10 cm. longa et 4 cm. lata, terminale ad 6 cm. lato, utrinque iuventute pilis appressis perpaucis ad 0·2 mm. longis sparse obsita [demum glabrescentia], margine pubescentiore, nervis primariis utrinque c. 5, ad marginem haud attingentibus. *Panicula* c. 15-florae, laxae, pedunculo 4–5 cm. longo incluso, 12–13 cm. longi, fere glabrae; rami floriferi tenues, inferiores ad 6 cm., superiores c. 1 cm. longi; bracteae caducae, anguste ovatae, c. 1 mm. longae; pedicelli sparse brunneo-pubescentes, 9–12 mm. longi; bracteolae ad 1 mm. longae, ad basin calycis arcte appressae. *Calyx* campanulatus, sparse et breviter appresse pubescens, margine pubescentior, tubo c. 4 mm. longo, dentibus late triangulariis haud 1 mm. longis. *Vexilli* lamina extus appresse et haud dense albo-pubescens, ovato-oblonga, basin nec rugosa nec appendiculata, ad 20 mm. longa et 16 mm. lata; unguis 6 mm. longus. *Alae* lamina ad apicem solum paulo albo-pubescens, oblonga, basin paulo auriculata, ad 18 mm. longa, 6–7 mm. lata; unguis 8–9 mm. longus. *Carinae* lamina etiam ad apicem paulo albo-pubescens, 17 mm. longa, versus apicem 8 mm. ad basin 5 mm. lata, vix auriculata; unguis 7 mm. longus. *Stamen* vexillare basin liberum, media parte ad alia leviter adhaerens; staminum aliorum partes connatae 20 mm., partes liberae 4–5 mm., antherae 0·8 mm. longae. *Discus* nullus. *Ovarium* pilis ad 1 mm. longis dense albotomentosum, 10 mm. longum, 6–7-ovulatum; stylus, basi excepto, glaber, in toto 17 mm. longus, parte infra curvum complanata, 1 mm. lata, 12 mm. longa, parte supra curvum tereti, 5 mm. longa; stigma erectum, minutum, capitatum. [*Legumen* albo-tomentosum, oblongum, 4–6-spermum, ad 12 cm. longum et 18 mm. latum. *Semina* inter se 4–5 mm. distantia, oblonga, ad axem leguminis transversale disposita, c. 12 mm. longa, 7 mm. lata, 2 mm. crassa, hilo terminale, carunculo annulare in ligulam lateralem, ad funiculum pedicellum versus valde dilatatum arcte appressam, producto].

Tanganyika. Ulanga District: Sanje near Ifakara, c. 8° 10′S., 36° 40′E., 300 m., Mkula R., in forest beside permanent stream, tree c. 7 m. tall, bark smooth, corolla purple, 6 Dec. 1958, *B. Anderson* 1227 (K, holotype, EA, isotype). Morogoro District: Kimboza Forest Reserve, small tree up to 7 m. tall, very common along riverside, July 1952 in fruit, *S. R. Semsei* 771 (EA, K).

Semsei 771 shows leaves and fruit only, without any inflorescence. It is just possible that the assumption that it is conspecific with *Anderson* 1227 is incorrect.

2. **M. usaramensis** *Taub.* subsp. **australis** *Gillett*, subsp. nov.

M. usaramensis sensu Dunn in Journ. Linn. Soc., Bot. 41: 224 (1912) pro parte.

A subsp. *usaramense* ut infra differt.

	subsp. *australis*	subsp. *usaramensis*
Pagina inferior folioli	subrufo pubescens	subglabra
Inflorescentia ..	subrufo pubescens	subglabra
Calyx	appresse pubescens	margine excepto, glaber
Legumen	saepius subrufo appresse tomentosum	saepius griseo vel argenteo appresse tomentosum

Portuguese East Africa. Manica e Sofala Province: Chimoio, *Mendonça* 626; Madanda forest, *Dawe* 446, 513, *Swynnerton* 1420 (BM); Chironda, lower Buzi River, *Swynnerton* 1425 (K holotype, BM isotype).

Nyasaland. Fort Johnston area, Manjawira, *G. Jackson* 1409.

Southern Rhodesia. Mtoka District: Nyadesi, *Lovemore* 453, 460. Mazoe District: Shamva, Chipedi farm, *Mowbray* 67. Umtali District: 70 km. S. of Umtali, *Armitage* 194/55. Chipinga District: *Goodier* 101, 114. Melsetter District: Wengezi, *R. Stocks* 5. Sabi valley, *Wild* 2371, 3470; *Chase* 973, 1317; *Phipps* 229.

The range of subsp. *usaramensis* extends from the Zambezia Province of Portuguese East Africa to the Coast Province of Kenya. Dunn's statement that *M. usaramensis* occurs in British Central Africa is based on a mistake; the 'Nyika country' of Wakefield is in Kenya. However a *Millettia* does occur in Northern Rhodesia ('British Central Africa') near Kawambwa which in the flowering condition seems close to *M. usaramensis*, though the flowers are rather longer. In the absence of fruit no certainty is possible. The specimens, *Fanshawe* 3689, 3855, 4073 are perhaps best regarded as a form of *M. eetveldeana* (Micheli) Hauman for the time being.

3. **M. schliebenii** *Harms* in Not. Bot. Gart. Berl. 13: 418 (1936).

The differences between this taxon, of which the fruit is unknown, and the polymorphic *M. usaramensis* are perhaps hardly of specific rank.

Tanganyika. Mlinguru 20 km. S. of Lindi, *Schlieben* 5743 (BM, isotype). Mrweka near Lindi, *Koerner in Herb. Amani* 2292 (EA). Mikindani, *Gillman* 1117 (EA).

4. **M. eriocarpa** *Dunn* in Journ. Linn. Soc. Bot. 41: 225 (1912).

The flowers of this species are unknown; its position in §*Berrebera* has thus to be confirmed. *Goetze* 207, a flowering specimen cited by Dunn as *M. eriocarpa* but not used in drawing up its description, was subsequently transferred by Dunn himself to *M. oblata* and is here referred to *M. oblata* subsp. *intermedia*. The striking difference in the indumentum and the acute tips of the leaflets seem to rule out the possibility that *M. eriocarpa* might be the fruiting stage of *M. schliebenii*, which occurs in much the same area though at a lower altitude.

Tanganyika. Lindi District, Noto Plateau, *Busse* 2920 (EA, K, isotypes). Newala District: Makonde Plateau, *Gillman* 1016.

5. **M. drastica** *Welw. ex Baker* in Fl. Trop. Afr. 2: 128 (1871); Hauman in Fl. Congo Belge 5: 25, tab. 2 & fig. 2 (1954).

This species has been reported from 1300 m. in the Uluguru Mts. by Harms (Engl., Bot. Jahrb. 28: 403 (1899)). The specimen concerned, *Stuhl-*

mann 9285, which has probably been destroyed, was almost certainly *M. oblata* subsp. *intermedia*. *M. drastica* may in external appearance be confused both with *M. oblata* and *M. eetveldeana* but, on dissection, is clearly distinguished from both by the presence of a collar-shaped disc similar to that of *M. ferruginea* and the shape of the standard.

Cameroons: Congo Republic: Angola.

6. **M. eetveldeana** (*Micheli*) *Hauman* in Fl. Congo Belge 5: 28, fig. 2A (1954).

'*M. sp.*' Eggeling & Dale, Indig. Trees Uganda, ed. 2: 308 (1952).

Professor Hauman has elucidated this species in the Congo and explained the differences between it and *M. drastica* Welw. ex Baker, with which it had hitherto largely been confused. He does not include East Africa in its range of distribution but it appears that certain specimens at Kew and Nairobi, which had either been treated as intermediates between *M. oblata* and *M. usaramensis* or as representative of some undescribed species, are best placed here. While most of their characters are intermediate between those of *M. oblata* and *M. usaramensis* their petals and stamens are longer than those of either species and agree well with Congo material of *M. eetveldeana*.

Uganda. Toro, Bwamba *Sangster* 504 (FHO), *St. Clair Thompson in Eggeling* 5242 (EA), *Eggeling* 3381.

Tanganyika. Usaramo District: Pugu hills, *J. H. Vaughan* 2931, 2932; *Fundi* 36; *Semsei* 1761; *Holtz in Herb. Amani* 7112 (EA). Lindi District: Rondo Plateau, *Bryce* 31, *Jones* 21 (FHO)., Newala District: Minjale, *Gillman* 1300; 16 km. N. of Newala, *Hay* 2.

Portuguese East Africa. Niassa Prov. Macondes Div.: Mueda area, *Pedro & Pedrógão* 5241, 5287, 5307, 5310, 5349 (all EA).

7. **M. oblata** *Dunn* in Journ. Bot. 49: 221 (1911) and Journ. Linn. Soc., Bot. 41: 223 (1912).

M. ferruginea sensu Taub. in Engl., Pflanzenw. Ost.-Afr. C: 212 (1895), *non* (Hochst.) Baker

This species inhabits several of the mountain blocks of Kenya and Tanganyika where well watered areas are found between 700 and 1900 m. In these discontinuous areas it exists in rather well-marked vicarious geographic forms to which it seems best to assign subspecific rank and which are described below.

α subsp. **oblata**

Leaflets more or less rusty pubescent below, the hairs on the midrib stiffly spreading. Inflorescence 12–20 cm. long including a peduncle of 4–10 cm. Hairs on pedicels c. 0·5 mm. long. Calyx teeth about 1 mm. long, acuminate. Blade of standard c. 12 mm. long by 14 mm. wide. Staminal sheath c. 12 mm. long. Pod brown, glabrescent with down-curved point, up to 10 cm. long by 18 mm. wide.

Tanganyika. Tanga Province, E. Usambara Mts: Amani, *Warnecke* 46K (EA, K lectotype); *Scheffler* 212 & *Buchwald* 79 syntypes; *Grote* s.n.; *Braun in Herb. Amani* 1544; *Zimmermann in Herb. Amani* 867, 1113A, 7108, 7109; *Peter* 19 Apr. 1914, 23 Dec. 1914, 20 Apr. 1915, 23 Jan. 1917, 16 Feb. 1917, 8 Feb. 1918; *Greenway* 2849, 3329, 4036, 5899, 6132; *Worsley in E.A. Herb.* 11535; *Watkins* 132; *Wallace* 919. W Usambara Mts.: Ngaraza Konge, 7 Mar. 1916, *Peter* K 565.

The specimens cited above are very uniform in shape, size and indumentum of the leaves and in floral characteristics. A plant with a sparser and whiter indumentum but otherwise similar is *Tea Research Institute* 1 (EA), said to have been collected at Mufindi, Iringa District, Tanganyika.

β subsp. **intermedia** *Gillett*, subsp. nov., a subsp. *oblata* indumento paginae inferioris foliolorum sparsiore, plus minusve appresso, ramisque inflorescentiae saepe paulo longioribus (ad 5 mm. longis) differt.

Inflorescentia saepius infra 20 cm., rariter ad 27 cm. longa. Vexilli lamina c. 11 mm. longa et 14 mm. lata. Filamentorum pars connata c. 12 mm. longa Legumen ad 11 cm. longum et 2 cm. latum.

Tanganyika. Tanga Province: S. Pare Mts., Tona-Wadu, 1900 m., 20 Feb. 1915, *Peter* K 488; W. Usambara Mts., Mtai escarpment, Sunga road., 1750 m., *Drummond & Hemsley* 2746; *Grant* M79/36; plantation at Lusboba 1350 m., *Grant* 274; Mukuyuni area, *Koritschoner* 1523. Eastern Province: Morogoro District, Uluguru Mts., Bunduki Forest Reserve, c. 1300 m., fairly common by rivers, Mar. 1953, *Semsei* 1093 (K, holotype, EA, isotype); 1200 m. *Goetze* 207; *Sonderberg* 104; NW. slopes, 1550 m., 15–20 m. tall, 3 Nov. 1932, *Schlieben* 2919; Mgeta, Mar. 1955, *Semsei* 2018; Kisaki road, 1500 m., 18 Dec. 1934, *Miss E. M. Bruce* 324; Southern Highlands Province: Njombe District, near Lupembe, 1800 m., in forest, scattered tree 20–30 m. tall, 20 Oct. 1931, *Schlieben* 1364.

Goetze 207 is cited by Dunn (1912) as *M. eriocarpa*; however he has corrected the Kew sheet in his own hand to *M. oblata*.

This subspecies has been called *intermedia* because in some respects it bridges the gap between subsp. *oblata* and *M. eetveldeana*. Petal-shape and size are as in the former; the sparser indumentum and rather longer inflorescence-branches suggest the latter.

γ subsp. **stolzii** *Gillett*, subsp. nov. a subsp. *oblata* inflorescentiis, floribus fructibusque maioribus praecipue differt.

Foliorum pagina inferior ut in subsp. α, vel ad rhachem solam vel ubique patente pubescens. Inflorescentia ad 35 cm. longa, ramis inferioribus ad 15 mm. longis. Pedicellus pubescens pilis 0·2–0·3 mm. longis, vel rarius paucis inter eos longioribus. Calycis lobi acuminati. Vexilli lamina ad 15 mm. longa et 18 mm. lata; alarum lamina ad 7 mm. lata. Filamentorum pars connata c. 13 mm. longa. Ovula c. 9; legumen ad 13 cm. longum et 25 mm. latum.

Tanganyika. Rungwe District: Rungwe Mt., 1400 m., tree 10 m. tall, flowers lilac, 13 Jan. 1909, *Stolz* 183 (holotype); Rungwe Mt., 1500 m., tree with smooth bark, flowers purple, fairly common, 21 Oct. 1932, *R. M. Davies* 301; Mkeji river, small tree, in fruit, Feb. 1954, *Paulo* 263.

Northern Rhodesia. Abercorn District: Sunzu Farm, tree 7 m. tall, flowers deep blue, planted as shade for coffee, 18 Sept. 1952, *F. White* 3723.

δ subsp. **teitensis** *Gillett*, subsp. nov.

Foliola inferne patente ferrugineo-pubescentia. Inflorescentia ad 21 cm. longa, ramis ad 3 mm. longis. Pedicellus patente pilosus, pilis c. 0·5 mm. longis. Calycis lobi vel rotundati vel triangularii sed non acuminati. Vexilli lamina c. 16 mm. longa et 18 mm. lata; alae c. 7 mm. latae; carina c. 8 mm. lata. Filamentorum pars connata c. 16 mm. longa. Ovula c. 6. Legumen ad 11 cm. longum et 2 cm. latum.

Kenya. Teita Hills, Sept. 1932, *Gardner in Forest Dept.* 2946; Chowia, 1800 m., small tree in scrub or forest tree up to 23 m. tall with rather corrugated brown bark and a usually crooked stem, July 1937, *Dale in Forest Dept.* 3781; near Wesu, 1600 m., tree to 8 m., flowers mauve, Aug. 1941, *Gardner* 1201; cultivated in Nairobi ex Teita Hills, flowers more profusely

than *M. dura*, Jan. 1948, *Bally* 6543; near Mundanyi, fairly common forest tree up to 7m. in open, flowers dark purple, 6 Feb. 1953, *Bally* 8587 (K, holotype, EA, isotype); footpath between Wazi-Ngerenyi road and Bura bluff, 1400 m., rocky hillside with scattered trees and thickets, shrub 5 m., standard rosy lilac, wings pale lilac, keel whitish tipped with lilac, stamens white, pod green, 17 Sept. 1953, *Drummond & Hemsley* 4390.

In its rather larger flowers this subspecies shows some approach to *M. dura*. It is described as '*Millettia sp.*' in Battiscombe & Dale, (1936).

ε subsp. **burttii** *Gillett*, subsp. nov.

Foliola 9–11, subtus pubescentia. Inflorescentiae ad 20 cm. longae, pedunculo ad 5 cm. longa incluso, ramis inferioribus ad 15 mm. longis. Calycis lobi acuminati. Vexilli lamina 16–17 mm. lata, c. 13 mm. longa. Alae 6 mm. latae. Filamentorum pars connata 15 mm. longa.

Tanganyika. Near Singida, rift wall, summit of eastern escarpment, 1500 m., shrub c. 2 m. tall, common, Dec. 1935, *B.D. Burtt* 5580 (K, holotype, BM, EA, isotypes)

This plant, whose fruit is unknown, needs further investigation. It may prove to represent a distinct species when more material is available. The area in which it occurs is isolated from those of the other subspecies of *M. oblata*, has a much lower rainfall (c. 700 instead of 1000–2000 mm. per annum) and is occupied by the distinctive 'Itigi thicket' type of vegetation. A related plant found in similar vegetation at Musondwe in NE. Northern Rhodesia is represented by *Fanshawe* 4839, also without fruit. This has shorter pedicels, more numerous leaflets and bracteoles at the base of the calyx and may be a form of *M. bequaertii* De Wild., a badly understood species in the eastern Belgian Congo.

8. **M. dura** *Dunn* in Journ. Bot. 49: 221 (1911) & in Journ. Linn. Soc., Bot. 41: 223 (1912).

With *M. ferruginea* to the north and the various subspecies of *M. oblata* to the south-east, *M. dura* provides an excellent example of vicarious distribution. The three species are clearly defined and nowhere do their areas overlap. It is all the more remarkable that the area of *M. dura* is itself very discontinuous. In the west it occupies a belt from Ruwenzori in the north to the Kasulu area of Tanganyika in the south. To the east it occupies a smaller area around Mt. Kenya. Between these two areas lies what would seem to be very suitable country on the slopes of Mt. Elgon and in the Nyanza Province of Kenya from which *M. dura* and all other species of *Millettia* seem to be entirely absent.

9. **M. ferruginea** (*Hochst.*) *Baker* in Fl. Trop. Afr. 2: 130 (1871); Fiori, Boschi e Pl. Legn. Eritrea (Bibl. Agr. Colon. No. 7): 183 (1912); Dunn in Journ. Linn. Soc., Bot. 41: 221 (1912); Cufod. Enum. Pl. Aeth. in Bull. Jard. Bot. Brux. 25: suppl.: 285 (1955).

Berrebera ferruginea Hochst. in Flora 92: 597 (1846); A. Rich., Tent. Fl. Abyss. 1: 190, t. 35 (1846).

α subsp. **ferruginea**

Ethiopia N. of 11° 30'N., Adoa, 18 June 1837, *Schimper* 279 (BM, K isotypes); Semien, valley below Enshedcap, 1853, *Schimper* 536 (or 526); near Adoa, 1862, *Schimper* 861; S. end Lake Tana, *Pichi-Sermolli* 507; *Salt.* s.n. (BM).

Central Ethiopia. Near Addis Ababa *Schantz* 35.

West Ethiopia (West of 36°E., 8°–9°N.) Gore, *Erskine* s.n.

β subsp. **darassana** (*Cufod.*) *Gillett*, stat. nov.

M. darassana Cufod. in Senck. Biol. 39: 297, t. 36 (1958).

Central Ethiopia. Jam Jam 50–60 km. W. of Addis Ababa, *Bally* 3088.

West Ethiopia (West of 36°E, 8°–9°N.) Dembidollo, *Mooney* 6879; Mt. Tulu Wallel, *Piffard* 51.

South Ethiopia (between 5° 40′–6° 40′N. and 37° 50′–38° 30′E.) Dabobesa SW. of Dilla, *Kuls* 188 (FR, holotype not seen); Wonago-Galma *Haberland* 2018 (FR, not seen); Aghere Mariam *Gillett* 14620; Keli, *Gillett* 14870; above Wondo, *Mooney* 5684.

Steudner 80 from Gondar, N. Ethiopa is intermediate between subsp. α and β.

The fruits of subsp. *darassana*, hitherto undescribed, are shown in *Gillett* 14620 and 14870 and *Mooney* 5684. They are flat, glabrescent, up to 23 cm. long and 25 mm. wide and do not differ from those of subsp. *ferruginea* seen in *Pichi-Sermolli* 507.

There are three mistakes in, or suggested by, Hochstetter's original description of *Berrebera ferruginea* which are repeated in Professor Cufodontis' account of *M. darassana*. As *M. ferruginea* is the type-species of §*Berrebera* it seems important that these should be corrected.

A. The colour of mature flowers is bluish purple or violet, 'porporina' according to Fiori. Dr. H. F. Mooney, while confirming this (in a letter) states that immature flowers may be pinkish or whitish, but Hochstetter's 'corollis albidis sericeis' probably refers to the silvery hairs on the outside of the standard.

B. The keel-petals in a bud of the Kew sheet of *Schimper* 279 (isotype) were lightly attached to each other, just as they were in *Steudner* 80, *Bally* 3088, *Erskine* s.n., *Gillett* 14870 and all other *Millettia* flowers examined. Probably Hochstetter opened a bud a little roughly and thus wrongly thought the keel petals were free.

Table 4. Some diagnostic characters used to separate *M. darassana* and *M. ferruginea*.

Character	*darassana*	*ferruginea*
1. Hairs of lower surface of leaflet	sparse, appressed, 0·2–0·3 mm. long	copious, spreading, 0·5–0·6 mm. long
2. Maximum leaflet-length	9 cm. or more	rarely above 7 cm.
3. Colour of hairs on inflorescence and calyx	blackish brown	golden
4. Position of hairs on calyx	some erect, others appressed	all appressed
5. Length of standard	26–30 mm.	under 25 mm.
6. Maximum pedicel-length	12 mm. or more	9 mm.

C. The vexillary stamen was indeed free from its neighbours in a bud of *Schimper* 279 (no mature flower being available). However the vexillary stamens was also free in a *bud* of *Gillett* 14870, but in a *mature flower* of the same number, as well as in mature flowers from the *Bally*, *Erskine* and *Steudner* specimens the vexillary stamen was lightly attached to its neigh-

bours as described for *M. darassana*, and as is usual in *Millettia*. It thus seems that in both subsp. *ferruginea* and subsp. *darassana* the vexillary stamen is free to begin with and becomes lightly attached to its neighbours by adhesion as the flower develops (see opposite).

TABLE 5. Correlation of characters with geographical distribution in specimens of the *M. darassana*/*M. ferruginea* complex. For explanation see text.

Specimens grouped by regions of Ethiopia	Characters 1–6 (see table 4)						
	1	2 (in cm.)	3	4	5 (in mm.)	6 (in mm.)	Summary
North of 11° 30′ N.							
Schimper 279 (type) ..	F	6·5–F	F	F	(17)–F	(7)–F	FF
Schimper 861 ..	F	7–F	F	D	—	9–F	F
Pichi-Sermolli 507	F	7–F	F	F	—	8–F	FF
Schimper 536 ..	F–D	7–F	F	F	—	7–F	F
Salt s.n. ..	F	5–F	F	F	24–F	8–F	FF
Steudner 80 ..	D	7–F	F	D	23–F	—	?
Central							
Schantz 35 ..	F	5–F	F	D	—	—	F
Bally 3088 ..	D	6–F	D	D	27–D	(9)–D	D
West of 36°E., 8°–9°N.							
Erskine s.n. ..	F	8–D	F	D	(20)–?	(8)–?	F?
Mooney 6879	D	8–D	D	D	27–D	(9)–D	DD
Piffard 51 ..	D	8–D	F	D	24–F	11–D	D?
South central							
Kuls 188 (type)	D	9+–D	D	D	30–D	12–D	DD
Gillett 14620 ..	D	7·5–D	—	—	—	15–D	DD
Gillett 14870 ..	D	(4·5)	D	D	27–D	13–D	DD
Mooney 5684	D	9–D	—	—	—	12–D	DD
Haberland 2018	D	9–D	—	—	—	—	DD

The existence of a well-marked collar-shaped disc in *M. darassana* like that of *M. ferruginea*, which is absent in *M. dura* and *M. oblata*, shows at once that the closest affinity of *M. darassana* is with *M. ferruginea*. Three of the characters separating these species have been shown to be without foundation. The remaining 5 characters used by Professor Cufodontis are compared in Table 4 in a slightly revised form, together with a sixth, maximum pedicel-length.

To show the extent to which these characters are correlated, and their geographical distribution, they are tabulated (in Table 5) in columns 1–6 for all specimens seen, as well as two described by Prof. Cufodontis. Numerical values are given where possible: D means as in *M. darassana*, F as in *M. ferruginea*. Brackets indicate that the organ concerned is immature and the data thus perhaps worthless. In the last column the specimen is summed up on a 1–5 scale; FF meaning wholly *ferruginea*; F, *ferruginea* with some *darassana* characters; ?, doubtful; D, *darassana* with some *ferruginea* characters and DD, wholly *darssana*.

To sum up: *Millettia* in S. Ethiopia is certainly genetically distinct from typical *M. ferruginea* from N. Ethiopia. On the other hand the difference is much less than would appear from the original description of *M. darassana*; about $\frac{1}{3}$ of the total number of specimens seen show some mingling of the characters of the two forms and in central and west Ethiopia such specimens are in the majority. This position seems best met by treating *darassana* as a subspecies of *ferruginea*.

The vexillary (dorsal) stamen in Millettia

As is well known the distinction between monadelphous and diadelphous stamens is of great importance in the classification of the *Papilionoideae* and the fact that in *Millettia* and some related genera the dorsal stamen is free in a few species but in most, while free at the base, adheres to its neighbours higher up has long been disconcerting as reducing the value of this character in tribal classification. The completely unexpected discovery (see p. 35, above) that in *M. ferruginea* the vexillary stamen is free in the bud but becomes attached to its neighbours later in the development of the flower reopens the question as to whether *Millettia* is monadelphous, diadelphous or heterogeneous in this respect and the buds of a random sample of 10 East African species were investigated from this point of view. The results are shown in Table 6: column C gives the length of the filament-sheath (the truly united part of the 9 lower stamens) as an index to the maturity of the bud or flower concerned; column D shows whether the vexillary filament is free or attached to its neighbours in its middle portion (it is always free at the base and near the tip).

From Table 6 it is clear that it is much more common than not for the dorsal filament in *Millettia* to be free in the young bud. Indeed it seems probable that, if anatomical methods were used, instead of the relatively rough methods of dissection applied in routine taxonomy, the dorsal filament would be found to be free in the very young buds of all species of *Millettia*. The subsequent attachment of the dorsal filament to its neighbours by a process of adhesion as the flower matures is clearly something entirely different from the complete union of the filaments *ab initio* which is found in truly monadelphous flowers. *Millettia* should be described as '*fundamentally diadelphous; usually becoming pseudo-monadelphous by a secondary process of adhesion*'.

Considering next the significance of this character for classification inside *Millettia* it seems that it is probably of little importance whether the small buds of a species are found to contain free vexillary filaments as in *M. usaramensis* or adhering vexillary filaments as in *M. eetveldeana*. For all that

this probably means is that the process of adhesion proceeds rather more rapidly in *M. eetveldeana* than in the closely related *M. usaramensis*. However

TABLE 6. The degree of attachment or otherwise of the vexillary stamen in flowers of varying states of development in species of *Millettia* (for explanation see text).

A Name of species	B State of flora examined	C Length of filament-sheath in millimetres	D Vexillary stamen
M. makondensis	bud	2	lightly attached
„	bud	4	attached
„	bud	5·5	attached
„	bud	7·5	attached
„	mature flower	8·5	attached
M. stuhlmannii	bud	5	free
„	larger bud	—	attached
„	mature flower	24–25	attached
M. puguënsis	bud	1	free
„	bud	1·5	free
„	bud	5	attached
„	mature flower	11	attached
M. sacleuxii	bud	—	free
„	mature flower	18–20	attached
M. micans	bud	7·5	free
„	bud	9	attached
„	mature flower	19–20	attached
M. impressa subsp. *goetzeana*	bud	2·5	free
„	bud	4·5	attached
„	mature flower	9	attached
M. paucijuga	bud	1·5	free
„	bud	4	lightly attached
„	flower	7·5	attached
„	mature flower	8	attached
M. usaramensis	bud	3	free
„	bud	7·5	attached
„	bud	9·5	attached
„	mature flower	13	attached

TABLE 6—*continued*

A Name of species	B State of flora examined	C Length of filament-sheath in millimetres	D Vexillary stamen
M. eetveldeana	bud	3	attached
,, ...	bud	5	attached
,, ...	mature flower	15–17	attached
M. ferruginea subsp. *ferruginea*	bud	5	free
,, ...	mature flowers	15–18	attached
M. ferruginea subsp. *darassana*	bud	5	free
,, ...	mature flower	19	attached

where the dorsal filament remains free right up to maturity as in *M. psilopetala* the fact may be of greater taxonomic significance as it suggests that the process bringing about adhesion, which is found in most of the genus, is here absent.

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Bananas.*—The appearance of an authoritative and up-to-date work on the banana, as this is, will be welcomed in many quarters. The older books, such as those by Fawcett (1913) and by Reynolds (1927), have fulfilled a useful function over a period of many years, but are no longer in keeping with the times having regard to the advances that have been made in banana production and particularly in such matters as banana breeding and disease control.

The writer has been engaged for many years on banana breeding and selection work, having been Senior Cytogeneticist at the Imperial College of Tropical Agriculture in Trinidad. He has also travelled in many other parts of the world in connection with his studies on wild and cultivated bananas and has a wide knowledge of all aspects of the banana industry.

The first two chapters of the book entitled 'botanical background' embody detailed accounts of all organs of the banana plant. Three chapters are devoted to the cultivated varieties of the banana and to many this may well be the outstanding and most important feature of the book. Other subjects receiving attention are—the historical aspect: climatic and soil relations of the crop: cultivation and harvesting: production, economics and trade: composition and utilization: breeding: pests and diseases. Diseases are not dealt with in great detail, except for recent developments, as these have been covered in Wardlaw's 'Diseases of the Banana'. However, special attention has been given to insect pests as no useful summary of this aspect of the subject exists.

The hope is expressed that 'the book will be of interest to the research worker who needs a ready source of information complete with bibliographies of scientific aspects of the crop; the Government agricultural officer who needs a source of information on cultivars and on agricultural aspects of banana cultivation; and the planter who may wish to understand why a certain practice is recommended and where and in what particulars he can safely depart from locally accepted methods of management'. The book, which is well written and well produced, should certainly fulfil these hopes.

F. N. HOWES

* *Bananas*. By N. W. Simmonds. Pp. xiv + 466, 4 colour plates (6 photographs), 32 half-tone plates (57 photographs), 55 text-figures, 54 tables. London: Longmans, Green & Co. Ltd., 1959. Price 45/-.

A new species of *Tephrosia* from south central Africa

J. B. Gillett

Tephrosia micrantha *Gillett*, sp. nov. *T. purpureae* (L.) Pers. affinis; foliolis angustis, subtus sericeis, stipulis longis, tenuiter subulatis, curvatis, floribus minoribus, leguminibusque brevioribus differt.

Herba haud diu perennans, vel annua, radice primario simplice sublignoso, caulibus divaricatis, tenuibus, subprocumbentibus, appresse albopilosis, pilis c. 0·7 mm. longis, vel subsericeis [rarius patente pubescentibus], ad 30 [–60] cm. longis. *Stipulae* saltem in partibus plantae inferioribus, tenuissimae, subulatae, paulo curvatae, ad 7–8 mm. longae, superiores interdum breviores et latiores. *Rhachis* folii albo- [vel stramineo-] subappresse [vel rarius patente] pilosa, ad 5 [–8] cm. longa; petioluli pubescentes, ad 1 mm. longi; foliola 4–6–[–9]-jugata, anguste oblongo-elliptica, apice rotundata vel rarius truncata vel acuta, basin cuneata, supra glabra [vel rarius breviter pubescentia], ad margines et inferne plus minusve sericea, ad 22 mm. longa et 4 mm. lata, costa mediana subtus subaurantiaca mucrone 0·5 mm. longo terminante, nervis primariis utrinque 8–9. *Racemi* et terminales et axillares et interdum folia oppositi, ad 15-flori, rhachi sericea [vel rarius patente pubescente] ad 15 cm. longa, pedunculo ad 5 cm. longo incluso; bracteae subulatae ad 4 mm. longae; pedicelli ad quemque nodum 2, sericei, c. 3 mm. longi; bracteolae desunt. *Calyx* sericeus, tubo c. 1.5 mm. longo, dentibus ovato-acuminatis, versus apicem subulatis, 1·5–2 mm. longis, duobus superioribus brevioribus, conniventibus. *Vexillum* externe patente albo-pubescens; lamina late ovata, 5 mm. lata, 4 mm. longa; unguis 1 mm. longus. *Alae* glabrae; lamina suboblonga, versus apicem rotundatum latior, basin aliquantum auriculata, c. 3 mm. longa et 1 mm. lata; unguis c. 2 mm. longus. *Carina* glabra; lamina plus minusve semicircularis, ab auriculo ad apicem paulo incurvatum 2·5 mm. longa, 2 mm. lata; unguis 1·5–2 mm. longus. *Filamentum* vexillare ad alios paulo adhaerens, 1 mm. supra basin dilatatum et aliquantum geniculatum; staminum pars connata 3–4 mm., partes liberae c. 1 mm., *antherae* 0·2 mm. longae. *Ovarium* 5–7-ovulatum, dense pubescens; stylus linearis, basi excepto glaber, apice inflexo, post anthesin deflexus. *Legumen* curvatum, pubescens pilis brevibus (0·1–0·2 mm. longis) patentibus [vel rarius appressis], 4–7-spermum, 2·5–3 [–3·7] cm. longum, 3–4 mm. latum. *Semina* reniformia, olivacea, atro-purpureo-maculata, c. 3 mm. longa, 2 mm. lata, 1 mm. crassa; hilum in medio latere, minute albo-carunculatum, rotundum.

Tanganyika. Rungwe District. Mulinda Forest, in fruit, 22 July 1912, *Stolz* 1444 and flowers purple, 27 March 1913, *Stolz* 1958. Songea District. By R. Nakawali, about 2·5 km. SW. of Kitai, on waste ground by roadside, 930 m., annual or short-lived perennial, shoots prostrate, radiating, grey-green or brownish, leaves green above with silvery margin, grey-green below, standard mauve with pale greenish yellow area near base, wings deep mauve with whitish claw, keel deep mauve at apex, whitish below, 8 March 1956, *Milne-Redhead & Taylor* 9112 (K, holotype). About 1 km. S. of Gumbiro on sandy ground by roadside in *Brachystegia–Uapaca* woodland, also abundant on gravel soil in *Brachystegia boehmii* grassland, 880 m., unripe pods green tinged reddish, 29 March 1956, *Milne-Redhead & Taylor* 9369A, 9369B. Lindi District. Tendaguru, 210 m., by paths in wooded grassland, 25 April 1930, *Migeod* 663 (BM). 40 km. W. of Lindi near bank of Lutamba Lake 3 April 1935, *Schlieben* 6211 (BM).

Nyasaland. Chifumbazi, April 1897, *Nicholson* s.n. p.p. Mzimba District. Mbawa, compacted soil in *Julbernardia* scrub woodland, tap rooted annual forming small prostrate cushions or large mats, leaves a slightly bluish green, silvery below, flowers magenta, one open per raceme, 13 March 1953, *G. Jackson* 1141 (BM, ZOM) and 5 April 1955, perennial prostrate weed, *G. Jackson* 1580. Zomba, lower Kasupe, 700 m., 13 March 1955, *G. Jackson* 1506 and *Exell, Mendonça & Wild* 829 (BM).

Southern Rhodesia. Hartley District. Poole farm 27 February 1952, *R. M. Hornby* 3281. Lomagundi District. Trelawny Tobacco Research Sta., 1200 m., 27 March 1943, *Jack* 142.

Northern Rhodesia. Abercorn District. Marsh below Nimkola, 800 m., sandy soil by track, annual, 23 Feb. 1955, *Mrs. Richards* 4646. Chisungu estate, 1400 m., in *Brachystegia* woodland, rare, wiry semi-decumbent annual, 20 April 1959, *Miss McCallum Webster* 840. Central Province. 10 km. E. of Lusaka, 1300 m., creeping in grass, 30 Jan. 1956, *King* 291. Chitala escarpment, 950 m., stony ground in *Brachystegia* woodland, annual herb, petals pink, yellowish white at the base, 12 Feb. 1959, *Robson* 1565.

The species of *Tephrosia* with small flowers and glabrous styles form, especially in southern Africa, one of the taxonomically most difficult parts of the genus. *T. micrantha* has hitherto been tentatively treated as a form of *T. purpurea*. However it has now been collected so often, with a fair constancy of type over what seems to be a natural area of distribution, that it is best treated as a species; it is no less distinct from *T. purpurea* than several accepted species in South Africa.

Some variation exists in *T. micrantha*. In *Milne-Redhead & Taylor* 9369B and *Jack* 142 the hairs on the stems, etc., are stiffly spreading; in one plant of *Nicholson* s.n. and in *King* 291 they are both spreading and fulvous. In *Mrs. Richards* 4646 the leaflets are up to 9-jugate. In *King* 291 the pods are up to 37 mm. long. In *Migeod* 663 and *Schlieben* 6211 the hairs on the pod are appressed.

In the foregoing account statements in square brackets are based on specimens other than the holotype. Specimens cited are at Kew unless otherwise indicated.

The correct name of Swertia decussata Nimmo (Gentianaceae).— The species is commonly found in western parts of the Decaan Peninsula from Konkan to Kerala at altitudes of 900–1,800 m.

The citation and synonymy of the species, as given by C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 127 (1885) is as stated below:

S. decussata Nimmo in J. Graham, Cat. Pl. Bombay: 249 (1839).

Ophelia densifolia Griseb. in DC., Prodr. 9: 125 (1845).

Ophelia alba Wight & Arn. in Wight, Illustr. t. 157-b, fig. 3F (1850), *nomen nudum*.

Ophelia multiflora Dalz. in Hook., Kew Journ. Bot. 2: 135 (1850); Dalz. & Gibs., Bombay Fl.: 156 (1861).

S. decussata Nimmo is, however, a *nomen nudum*. The first validly published name of the plant in order of priority is *Ophelia densifolia* Griseb. Under the 'International Code of Botanical Nomenclature', the species should bear the oldest validly published specific epithet, provided that epithet had not already been used in combination with the generic name in question. The correct name of the species under the genus *Swertia* is, therefore, **Swertia densifolia** (*Griseb.*) *Kashyapa*, comb. nov.

K. Kashyapa (C.S.I.R., India)

Problems relating to the *Gentiana cachemirica* of the 'Flora of British India'

Harry Smith (Uppsala)

This study is based chiefly on material received on loan from the herbaria of the Indian Botanic Garden, Calcutta (CAL), the British Museum (Natural History) (BM), the Royal Botanic Garden, Edinburgh (E) and the Royal Botanic Gardens, Kew (K). I wish to express my most sincere thanks to the Directors of these Institutions for their never failing helpfulness and for their patience with long kept loans.

In the description of *Gentiana cachemirica* (Fl. Brit. Ind. 4: 115 (1883)) C. B. Clarke made some peculiar statements which do not agree with this species as we know it. He ends his discussion of the plant with the following comments: 'Numerous examples, stemless or nearly so, can hardly be distinguished from *G. depressa*, except by the wide sinus between the calyx-teeth'. This declaration makes it evident that the plant Clarke had in mind cannot be *G. cachemirica* Decaisne; it must be something quite different. What this was is explained by his quoting *G. stipitata* Edgew. (Trans. Linn. Soc. 20: 84 (1846)) as a synonym. It is on this entirely different species from another section that his description of *G. cachemirica* is partly based. Clarke never made the acquaintance of Decaisne's plant. In an earlier paper 'Notes on Indian Gentianaceae' (Journ. Linn. Soc., Bot. 14: 438 (1875)) he stated that *G. cachemirica* was 'mihi ignota'. There he also made a tentative speculation on that species, adding to the short latin diagnosis under 'G. —, sp. no. 30 Hook.f. et Th.' (=G. amoena C.B.Cl.) 'an haec planta vera *G. Cachemirica* esse potuit, sepalis obovatis non obstantibus?'. It should be noted that in this paper he quotes *G. stipitata* Edgew. as conspecific with *G. depressa* D. Don. It was later, when compiling the 'Flora of British India', that he arrived at the conclusion that Edgeworth's species was synonymous with *G. cachemirica*. Apparently he never felt any misgivings about this last identification, and did not trouble to compare *G. stipitata* Edgew. with Decaisne's accurate description and drawing. If he had, he would immediately have discovered the mistake.

It is highly improbable that true *G. cachemirica* was at that time represented in the Kew Herbarium, and to English botanists the species was certainly unknown. If J. D. Hooker had been aware of its existence he could never have written when describing *G. loderi*: ' . . . quite unlike any Indian species, . . . ' (Hook., Ic. Pl. 15: 32, t. 1440 (1883)). Decaisne's drawing of *G. cachemirica* (in Jacquemont, Voy. Ind. 4, Bot., t. 117 (1844)) and Hooker's (*l.c.*) are strikingly alike. The only difference worth mentioning is that the former depicted a specimen with narrow and upright calyx-lobes, whereas the lobes in Hooker's plant were spathulate and somewhat recurving. This difference is of small taxonomic significance; all kinds of intermediate forms are common. *Gentiana loderi* Hook. fil. is conspecific with *G cachemirica* Decaisne, which latter is the correct name. The epithet *loder-* can be used only to indicate forms with broad calyx-lobes, but these are of small or no taxonomic standing.

Kusnezow referred *G. cachemirica* to his newly-established section *Isomera* (Act. Hort. Petrop. 15: 339 (1896)). This section has proved to be an unnatural construction and cannot be maintained. He placed there 4 species (5 counting *G. loderi*). Of these *G. cachemirica* goes to section *Pneumonanthe*. It is in every respect convergent with other species of that section, and is in fact rather closely related to the westernmost form of *G. septemfida* Pall., the var. *lagodechiana* Kusn. The other three, *G. depressa* D. Don, *G. emodi* Marq. (=*amoena* C. B. Clarke) and *G. delavayi* Franch. are all true members of section *Frigida*, as is shown *i.a.* by their type of seed.

Kusnezow corrected Clarke's mistake in identifying *G. stipitata* with *G. cachemirica*, but at the same time he made a new error when he quoted *G. stipitata* as conspecific with *G. depressa*. This mis-interpretation has led to the unmerited disregard of Edgeworth's well-founded and highly interesting species. It is true, as Clarke pointed out, that the flowers of *G. depressa* and *G. stipitata* are deceptively alike. This similarity is to a certain extent misleading. The morphological organizations of the two plants are widely divergent. Yet, they carry so many common features in the construction of leaves and flowers that it is impossible to regard these as mere coincidences. Some kind of connection between them must be supposed. This interesting question, bearing on the origin of *G. depressa* and allied species will be discussed below.

Section *Frigida* is divided* into two subsections: *Sympodiae* and *Monopodiae*, characterized, as the names imply, by different modes of growth. In *Sympodiae* the growing point is lateral and constantly renewed, in the *Monopodiae* it is apical and everlasting. To examplify: the sympodial *G. depressa* sends lateral runners from the geocorm†, the runners finally ending with a rosette. When this rosette has grown strong and in its turn sent out new runners it develops an *apical* inflorescence, thereafter it withers and dies. In the monopodial *G. stipitata* the rosette is stationary and everlasting, issuing yearly a new set of leaves from the apex. The inflorescences are produced laterally from the axils of last year's rosular leaves. This differentiation of the *Frigidae* according to the two principles of growth provides a natural dividing line. Nothing of doubtful nature is known, neither does hybridization between the two subsections seem to occur.

The specific quality of *G. stipitata* was recognized by Burkill according to an annotation by him on a sheet at Kew. Unfortunately, he did not publish his rediscovery of this distinct species. *Gentiana stipitata* is a remarkable plant. It is the sole Himalayan representative of a primitive group among the *Monopodiae*, the series *Rosulatae* (further discussed below), which is deeply involved with the originating of the series *Ornatae*.The nearest ally to *G. stipitata* is without doubt *G. tizuensis* Franch. from western China, a plant I have had the opportunity to study in the field. These two species, together with a score of others occurring in scattered localities from SW. Kansu, Sikang and SE. Tibet to Formosa, Borneo and the Celebes, constitute a well delimited series among the *Monopodiae*, the series *Rosulatae*. They are characterized by perennial roots and a well developed many-leaved, apical rosette. Their life-form is different from the pseudohapaxanthic one of the

* Classification of the section *Frigida* is summarized on p. 54.

† See G. E. Du Rietz in Acta Phytog. Suec 3: 48 (1931).

FIG. 1. *Gentiana tizuensis* Franch.—Specimen from exposed situation, c. 7 years old (*H. Smith* 11970). Nat. size. Drawn by Sven Nilsson.

series *Ornatae*, which is characterized by rootlets of the liliaceous type, that is, they last for one year only; the rosette is few-leaved and the leaves are often reduced to scales.

The majority of the species of series *Rosulatae* (the subseries *Apteroïdeae*) inhabit the warmer parts of SE. Asia. Only a few of them (the subseries *Monanthae*) have found a foothold in alpine regions. This is certainly due to the monopodial mode of growth, which demands fairly warm winters and makes the plant unfitted to endure harsh climatic conditions. The reason for this is that the evergrowing rosette becomes raised in height with every passing year and thus gets more and more exposed. In an alpine climate, the unprotected vital growing-point of the plant (i.e. the apex of the rosette) will be exposed to the cold of winter with fatal results.

Still, the subseries *Monanthae* consists of purely alpine species. How these meet the climatic difficulties, and manage to overcome them is beautifully demonstrated by the above mentioned *G. tizuensis*. In well-sheltered situations the plant keeps upright. But in more exposed localities it behaves differently. The strong roots produced from the collar drag the rosette downwards, usually in a sideway fashion. This procedure is repeated every year, and the vital growing-point is thereby always kept at ground level. The lengthening geocorm becomes horizontally outstretched though it started from the perpendicular taproot (Fig. 1).

Another alpine species, *G. szechenyi* Kanitz—also studied in the field—examplifies a slightly divergent pattern. Strong roots are here also produced from the collar, but the primary taproot has disappeared. The sole hypogeic part of the plant which remains perennial is the geocorm, i.e. the more or less buried, downdragged lower parts of the evergrowing stem. The geocorm remains as a rule quite short, decaying at base in about the same order that it is prolonged at top by the yearly growth. Only in favourable and well sheltered situations does the geocorm attain any greater length. *Gentiana szechenyi* depends solely on the secondary roots, produced from the collar, which last for several years.

Compared to the series *Ornata*, the series *Rosulatae* represent a primitive type of subsection *Monopodiae*. It is presumably *older* than the rise of the Sino-Himalayan ranges. Once it must have been more richly represented westwards than it is now, distributed as far to the west as the habitats of *G. stipitata*. During the ages of upheaval all the species which inhabited the rising areas were subjected to the rigour of an ever more intensified alpine climate. Many of them might have been exterminated, but it is reasonable to suppose that a number of them could have found a mode of survival similar to that found by *G. tizuensis* and *G. szechenyi*. It is also resonable to suppose that some of these early forms carried the schemes of those two a step further. In the prevailing severe climatic conditions the perennial rootstock and geocorm had turned out to be not only useless and inconvenient, but in fact directly harmful. Their endeavour to lift the vital growing-point to a dangerously exposed position must continually be counteracted for the life of the plant not to be jeopardized. Unsuitable qualities often get lost during the course of evolution. Thus, the disadvantageous perennial parts of the plant were ultimately discarded altogether. Having arrived at such a stage, the plant had to produce yearly new roots from the base of the rosette, as neither taproot nor geocorm remained. Unhampered by accumulating old parts the rosette could now be kept at ground level in a comfortable way. But the plant had *ceased to be a perennial* in the true meaning of the word. It had assumed that kind of hapaxanthic life-form, which is carried on without perennial parts: the plant renewing yearly the whole of its body except the apex of growth which is enclosed in a central bud. This life-form is exactly the one by which the famous series *Ornatae* is characterized. It is more than likely that the 'pro-genitors' to the series *Ornatae* originated in this way.

During the unsettled ages of the harshening climate another event probably also took place among such 'progenitors'. The subsection *Sympodiae* is not homogenous. Two distinct series can be discerned, the *Algidae* and the *Depressae*, and these are divergent in many ways. The series *Algidae* date back to ancient times and are distributed all over alpine and arctic Asia, the European Alps and North America. The series *Depressae*, comprising *G. depressa* and 4 allied species, is found only in the Himalayas, and is certainly for several reasons of much more recent origin. I was for a long time at a loss to know how to account for it, but am now convinced that the ancestors of this series must also be looked for among the 'progenitors'. Among such species a mutation must at one time have occurred which switched the mode of growth from monopodial to sympodial. This change did not effect the plant much in other respects. The series *Depressa* has to a great extent maintained the appearance of species allied to *G. stipitata*. It has so many

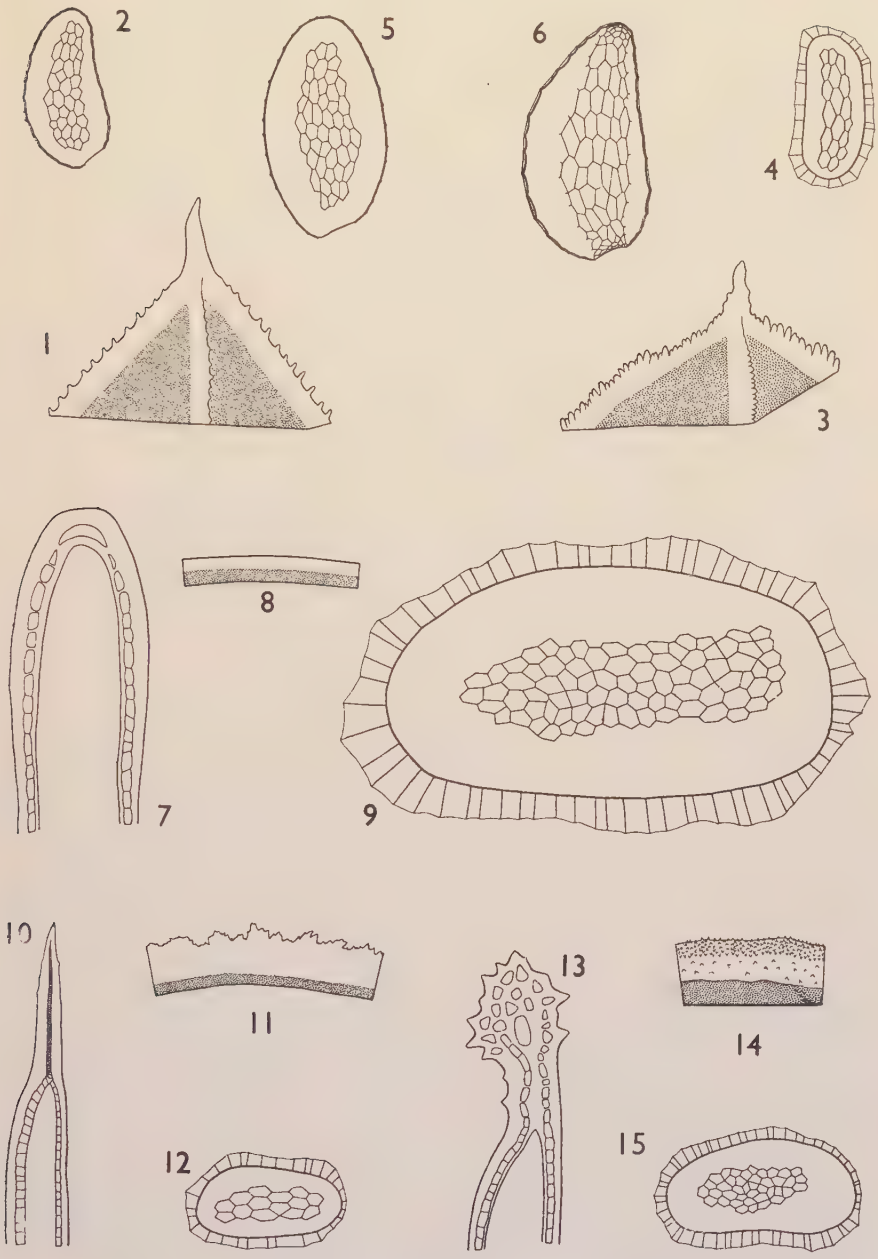


FIG. 2. *Gentiana stipitata*—1, apex of leaf; 2, seed. *G. depressa*—3, apex of leaf; 4, seed. *G. tizuensis*—5, seed. *G. szechenyi*—6, seed. *G. urnula*—7, margin of calyx-lobe in cross-section; 8, margin of calyx-lobe seen from outside; 9, seed. *G. lacerulata*—10, margin of calyx-lobe in cross-section; 11, margin of calyx-lobe seen from outside; 12, seed. *G. emodi*—13, margin of calyx-lobe in cross-section; 14, margin of calyx-lobe seen from outside; 15, seed. 7, 10 and 13, × 100, the rest × 20. Only surface and circumferential cells of seed drawn.

special characteristics in common with them that only a direct descendence can give an acceptable explanation. The change from monopodial to sympodial growth took place at a time when the evolution among the 'progenitors' had advanced so far that their seed had taken on the distinctive *G. ornata* seed-shape: subangularly oblong, the cells of the testa with highly raised lateral walls forming a honeycomb-like structure. This shape is distinct from that of the seed of the *G. stipitata* group. There the seed is regularly ovoid, the testa strongly reticulate, but the lateral walls are not raised in the honeycombed fashion. In the series *Algidae* the seed is coated by spongy unequally thick layers of airfilled more or less cystiform cells.

The theory on the origin of series *Ornatae* might also give a reasonable explanation both of the unequal distribution and of the great variability among the species belonging there. It is to be supposed, that the series *Rosulatae* were more numerous in the central than in the marginal parts of their old range. Consequently, a greater number of species ought to have existed in the eastern than in the western parts of the rising areas. Accordingly, in the eastern parts a richer assortment of species had the chance to develop along the patterns outlined by *G. tizuensis* and *G. szechenyi* and thus give rise to a greater number of differently shaped 'progenitors'. And, in fact, for every known species of series *Ornatae* in the Himalayas the Sino-Tibetan borderlands can boast of at least five.

It is questionable if this alone can account for the chaotic state of the series *Ornatae* in the borderlands. Another circumstance may be an additional cause. It has been noted both in *Gentiana* and in allied genera, that, when a 4-merous species has made its appearance in a normally 5-merous group of plants, taxonomic difficulties are coming in. It seems as if such a happening should initiate a disturbance of the balance in the hereditary properties and activate the faculty of mutability. Complications arising from this source are likely to turn up in the borderlands. *G. tizuensis* is 4-merous, and so could other now extinct species have been. The Indo-Himalayan species of the *Ornatae* are all regular: the flowers 5-merous, the leaves opposite. In the Sino-Tibetan borderlands the scope of variability is of another order. The flowers are 5-, 6-, 7- to 8-merous, and the leaves are opposite, 3-, 4-, 5-, 6- or 7-verticillate. In the borderlands the *Ornatae* show a seemingly unlimited abundance in forms of all taxonomic degrees, of hybrids and hybridogenous populations often comprising emancipating strains. They offer here a telltale display of an 'exploding' group of plants hardly matched anywhere else.

Key to species of Gentiana here discussed and to some related species

Flowering stems 5–14 cm. high arising from a *leafless* caudex; cauline leaves in c. 10 pairs, of subequal size, short-petiolate, glabrous, ovate or oval, longer or shorter than internodes; stipe of ovary not prolonged at maturity; seed ellipsoid with subacute ends; testa indistinctly reticulate (to section *Pneumonanthe*) . . . . . 1. *cachemirica*

Rosular leaves present in some *Ornatae* sometimes reduced to scales, tufts of many prolonged at maturity and forming *Algidae* except, rosular leaves present, seed ovoid and testa reticulate. (Section *Frigida*):

Growth sympodial, rosular margins ciliate producing leafy inflorescences from axils of last year's rosular leaves. (Subsection *Monopodia*):

Root or prostrate primary rosette of rounded leaves always present, seed ovoid; testa reticulate. (Series *Rosulatae*):

Taproot and horizontal glaucous flower 1 cm. long or more, fullgrown leaves to 7 cm. long by 1·2 cm. broad; runners produced from the lower leaf-axils . . . . . 2. *szechenyi*

Taproot and horizontal peduncle present. Flower barely exceeding 3·5 cm. in length; fullgrown rosular leaves at most 2 cm. long by 0·7 cm. broad; no runners produced:

Flowers 4-merous . . . . . 3. *tizuensis*

Flowers 5-merous . . . . . 4. *stipitata*

Roots composed of annual rootlets only, coarse, if present, few-leaved, seed subangularly oblong, lateral walls of cells in testa much raised forming a honeycomb-like coating. (Series *Ornatae*):

Growth sympodial, rosular leaves persistent, decaying after having produced the apical inflorescences. (Subsection *Sympodiae*):

Seed coated by an unusually thick spongy stratum of air-filled, cystiform or open cells. (Series *Algidae*):

Seed coated by a single layer of cells with much raised somewhat arcuately lateral walls forming a honey-comb-like structure; plants annual or nearly so (except 6, *G. amplicrater*). (Series *Depressae*):

Calyx-lobes with acute apex:

Plant caespitose, scarious margin of leaves and calyx-lobes white-membranous, tube, narrowly papillose, calyx-lobes usually narrowed at base . . . . . 5. *depressa*

Flowering stems solitary, 1–10 cm. high, bearing 1–4 flowers; margin of leaves and calyx-lobes white-cartilaginous with a smooth, glassy edge; calyx-lobes not narrowed at base
6. *amplicrater*

Calyx-lobes broadly truncate, mostly emarginate:

Leaves and calyx-lobes with a narrow, perfectly smooth white-cartilaginous margin, seed largest in the genus, 2·3–3·5 mm. long by 1·6–1·8 mm. thick. (Fig. 2/7–9) . . . 7. *urnula*

Leaves and calyx-lobes with a broad, papillose or laxerate white-membranous margin, seed up to 1·3 mm. long by 0·7 mm. thick:

Margin of leaves and calyx-lobes extremely thin, minutely lacerate; flower 2·5–3·5 cm. long, lobes of corolla apiculate, acute vel subobtuse; seed c. 1 mm. long by 0·6 mm. thick; cells of testa from end to end c. 10. (Fig. 2/10–12) 8. *lacerulata*

Margin of leaves and calyx-lobes covered by minute acute papillae, distinctly thickened at edge of margin; flower 1·5–2·5 cm. long; lobes of corolla obtuse, hardly apiculate; seed to 1·3 cm. long by 0·7 mm. thick, cells of testa from end to end c. 20. (Fig. 2/13–15) . . . . . 9. *emodi*

Enumeration of species

Section PNEUMONANTHE Neck.

1. **Gentiana cachemirica** *Decaisne* in Jacquemont, Voyage Ind. 4, Bot.: 111, t. 117 (1844), *non G. cachemirica* sensu C.B.Cl. in Fl. Brit. Ind. 4: 115 (1883).

G. loderi Hooker fil. in Hook., Ic. Pl. 15: 32, t. 1440 (1883).

Distribution: Kashmir. From 2400–3600 m. Average of 10 reports on altitude above sea-level: 3300 m.

Section FRIGIDA Kusn.

Subsection Monopodiae H. Sm., series Rosulatae H. Sm., subseries Monanthae H. Sm.

2. **G. szechenyi** *Kanitz*, Pl. Exped. Szechenyi in As. Centr. Coll.: 40 (1891).

G. rosularis Franch. in Bull. Soc. Philom. Paris, sér. 8, 3: 148 (1891).
G. callistantha Diels & Gilg in Futterer, Durch Asien, Bot.: 14 (1903).
G. georgei Diels in Not. Bot. Gard. Edinb. 5: 221 (1912).

Distribution: SE. Tibet, Yunnan, Sikang, W. and N. Szechuan, E. Tibet (Kham), SW. Kansu. From 2100–4500 m. Average of 23 reports on altitude above sea-level: 3920 m. Fig. 2/6 (p. 47).

3. **G. tizuensis** *Franchet* in Bull. Soc. Bot. Fr. 43: 60 (1896).

Distribution: Sikang, NW. Szechuan. From 3300–4100 m. Average of 7 reports on altitude above sea-level: 3640 m. Fig. 1 (p. 45) and 2/5 (p. 47).

4. **G. stipitata** *Edgeworth* in Trans. Linn. Soc. 20: 84 (1846).

[*G. cachemirica* sensu C. B. Clarke in Fl. Brit. Ind. 4: 115 (1883), *non* Decne.].
[*G. depressa* sensu Kusnezow in Act. Hort. Petrop. 15: 342 (1896), pro parte, *non* D. Don].

Edgeworth's diagnosis is good, but I do not quote it here as it is rather long and enumerates a lot of non essential details. The important features are as follows:—

Root perennial, crowned by an evergrowing, stationary rosette (sometimes by division of caudex several). Branches one to several, ascending, 2–5 cm. long, one-flowered, produced from the axils of last year's rosular leaves. Rosular leaves crowded, sessile or nearly so, ovate-lanceolate to obovate-lanceolate, upper part of nerve cristate and papillose, apex distinctly mucronate, margin membranaceous, minutely papillose, fullgrown leaves c. 2 cm. long by 0·7 cm. broad; lower leaves of flowering stems small, usually shorter than internodes, broadly ovate, acute, short-petiolate, 3–5 mm. long by 3 mm. broad, upper much increasing in size and enveloping base of flower, broadly sessile, lanceolate, up to 1·4 cm. long by 0·4 cm. broad. Internodes, vaginae and margin of leaves densely papillose. Calyx-lobes c. 5 mm. long by 3 mm. broad, ovate-oval, often somewhat narrowed at base, margin thin, membranaceous, minutely papillose, apex mucronate, nerve on back cristate and papillose. Corolla 2·5–3·4 cm. long, 1·5–2 cm. wide at the mouth, usually pale blue, outside of lobes with dark striations; lobes broadly ovate, apiculate, c. 4 mm. long by 4–5 mm. broad; plica narrow triangular, acute, half as long as the lobes. Style c. 5 mm. long. Seed ovate, somewhat curving, c. 1·1 mm. long by 0·6 mm. thick; testa distinctly reticulate. Fig. 2/1, 2 (p. 47).

Distribution: Tehri-Garhwal, Kumaon, Nepal, from 1500(?)–4200 m. Average of 12 reports on altitude above sea-level 3650 m.

Subsection Sympodiae H. Sm., series Depressae H. Sm.

5. **G. depressa** *D. Don*, Prodr. Fl. Nepal.: 125 (1825).

Distribution: Nepal, Sikkim, Bhutan, S. Tibet. From 2700 to 4800 m. Average of 20 reports on altitude above sea level 3950 m. Fig. 2/3, 4 (p. 47).

6. **G. amplicrater** *Burkill* in Journ. As. Soc. Beng. 2: 312 (1906).

Distribution: Nepal, Sikkim, S. and SE. Tibet. From 3900 to 4800 m. Average of 14 reports on altitude above sea-level 4265 m.

7. **Gentiana urnula** *H. Sm.*, sp. nov.

G. amoena C. B. Clarke var. *major* Burkill in Journ. As. Soc. Beng. 2: 312 (1906).

G. amoena C. B. Clarke forma *pallida* Marq. in Journ. Linn. Soc. Bot. 48: 204 (1929).

Species affinitate *G. emodi* Marq. a qua inter alie distat marginibus foliorum et loborum calycis perfecte levibus et seminibus multo majoribus.

Planta perennis, omnino glabra, laxissime caespitosa; caudiculi prostrati, sparse ramosi, ut rami longe repentes, laxe parvifoliati, apice rosula foliorum majorum imbricatorum coronati; rosula adulta inflorescentiam apicalem producens, demum post fructificationem moritura. Folia omnia angustissime cartilagineo-marginata et perfecte levia; caudiculina truncato-spathulata, 3–7 mm. longa et c. 5 mm. lata, rosularia obovato-cuneata, latissime truncata, apice subemarginata, ad 15 mm. longa et 17 mm. lata; flores apicales, sessiles, basi foliis rosularibus involucrati, vulgo solitarii, interdum bini vel

terni, urceolati, 2–4 cm. longi ad 1·5 cm. diametientes, parte inferiore albidi, sursum vulgo violascentes et atro-coeruleo-striati; calyx late campanulatus, tubo ad 16 mm. longo, lobis latissime truncatis, rectangulariter obconicis, apice subemarginatis et minutissime apiculatis, ad 5 mm. longis et 7 mm. latis vel in speciminibus depauperatis minoribus; corollae tubo late cylindrico, 1·6–3·5 cm. longo, lobis late ovatis, obtusis, c. 5 mm. longis et latis, plicis integris, triangularibus lobis paullo brevioribus; stamina (in flore magno) tubo c. 10 mm. alte adnata, filamentis liberis c. 9 mm. et thecis c. 3 mm. longis; capsula matura ad 19 mm. longa et 7 mm. crassa, in stylos graciles c. 8 mm. longos sensim attenuata, stipite ad 50 mm. longo; semina pro genere maxima, angulariter oblonga, ad 3·5 mm. longa et 1·8 mm. crassa, testa subhexagonaliter lamelloso-areolata. Fig. 2/7–9 (p. 47).

Bhutan: Nelli La near Lingshi Dzong, 4500 m., calyx white, tipped red brown; corolla shiny satin white at base; plicae pale heliotrope; tips of corolla segments striped purplish black; inside the corolla is pale heliotrope in its upper half, white in the basal half and spotted purplish black at base; bracts or leaves at base of corolla red brown outside, greenish white inside; growing in pure scree; seed taken; 13 Oct., 1949, *Ludlow, Sherriff & Hicks* 17458 (holotype, BM). Yelé La, Timpu, 4800 m., cunningly hidden by similarity of foliage to surrounding chips of stone, *R. E. Cooper* 1855 (E).

Tibet: Kambajong near the Sikkim border, 5700 m., Sept., 1903, *D. Prain* (holotype of *G. amoena* var. *major* Burkill (K). Mt. Everest Exp. 5100–5700 m., Sept., 1921, *A. F. R. Wollaston* 204, 213, 214 (K). Mt. Everest Exp. 1922, Rongbuk, 4800 m., 6 June, 1922 (K). Ibidem, 5100 m., *R. W. S. Hingston* (K). Ibidem, glacier, 5400 m., 16 May, 1938 (K). Border above Tsethanka, 4500 m., 18 July, 1939, *B. J. Gould* 2397 (K). Near Phari, 4350 m., Sept., 1938, *B. J. Gould* 1634 (K). Nangtse, 32 km. W. of Lhasa, 3900–4350 m., 5 Oct., 1943, *Ludlow & Sherriff* 9956 (BM). Hills S. of Lhasa, 4800 m., 21 Aug., 1942, *Ludlow & Sherriff* 9022 (BM). Hills W. of Lhasa one day beyond Trisum bridge, 4800 m., in loose scree; flowers white, streaked blackish purple on outside of corolla, 1 Sept., 1942, *Ludlow & Sherriff* 9062 (BM). Prov. Tsang (Shang), 1951–1952, *P. Aufschneiter* (BM). Reting, 96 km. N. of Lhasa, 4500 m., 1 Aug., 1944, *Ludlow & Sherriff* 11093 (BM). Ibidem, 4800 m., 31 July, 1942, *Ludlow & Sherriff* 8977 (BM). SE. Tibet: Dza La, 5100 m., 10 Aug., 1934, *Ludlow & Sherriff* 789 (BM). Tsari distr., Cha La, 4800 m., 17 Oct., 1938, *Ludlow & Sherriff* 6365 (BM). Prov. Charme, Le La, 5100 m., 23 Oct., 1938, *Ludlow & Sherriff* 6399 (BM). Trakan La, Char Chu, 4950 m., 22 Sept., 1936, *Ludlow & Sherriff* 2704 (BM). Atsa (pass above monastery), 4800–5100 m., 27 Aug., 1924, *Kingdon-Ward* 6149 (holotype of *G. amoena* forma *pallida* Marq. (K)).

G. urnula is an inhabitant of the high-alpine screes, where the creeping, mostly prolonged stems and runners strictly keep to the ground. It is variable both in size and in colouring, the flowers being from 20 to 40 mm. in length, and the colour from whitish to blue-violet at least in the upper half, always with dark striations and spots on the outside. The plant is easily recognized by the smooth margin of leaves and calyx-lobes, by the papery structure of the wide-cylindric corolla and by the seed, which is so very much larger than in any of the related species.

Distribution: Bhutan, S. and SE. Tibet, from 4350 to 5700 m. Average of 15 reports on altitude above sea-level 5280 m.

8. **Gentiana lacerulata** *H. Sm.*, sp. nov.

G. sp. No. 30 apud C. B. Clarke in Journ. Linn. Soc., Bot. 14: 438 (1875), pro parte

Species *G. emodi* Marq. affinis et eam similans, sed distat: planta robustiore, caudiculis et ramis longioribus, flore majore 2·5–3·5 cm. longo (nec 1·5–2·5 cm.), lobis corollae acutis-subobtusis, apiculatis (nec obtusis, emucronatis), foliis et lobis calycis membranaceo-marginatis, marginibus tenuissimis

lacerulatis (nec incrassatis et in superficie acute micro-papillosis), seminibus minoribus c. 1 mm. longis et 0·6 mm. crassis (nec 1·3 × 0·7 mm.), cellulis testae secus longitudinem seminis c. 10 (nec c. 20). Fig. 2/10–12 (p. 47).

NEPAL: Arun valley, Thudam E. of Chyamtang, 4500 m., 17 Sept., 1956, *J. D. A. Stainton* 1693 (BM). Huanangi, 3900 m., Aug., 1888, *King's collector* (CAL). Cheyirun, towards Wallanchoon, 1887, *King's collector* (CAL). Ghunsa, 3300 m. seed taken, Nov., 1955–Jan. 1956, *Mrs. M. A. Brough* 207 (BM).

SIKKIM: mountains around Rungbi River, 4200–4500 m., 1857, *T. Thomson* (CAL). Kabru, Oct., 1904, *Burkill's collector* (CAL). Sine loco, 8 Dec., 1903, *Prain's collector* No. 99 (CAL). Hewhalungi, Sept., 1900, *Prain's collector* 203 (CAL). Sine loco, 4200–5400 m., *Herb. Sulp. Kurz* (CAL).

TIBET: near Phari, 4500 m., Sept., 1938, *B. J. Gould* 1605. Rhe Dzong, 4050 m., 8 Sept., 1935, *Cutting & Vernay* 96a (K). SE. Tibet: Mönyul prov., Pö La, 27° 55′ N., 92° 0′ E., 3600–3900 m., corolla browny purple on outside; segments blue-violet within; plicae very pale blue; corolla spotted blue-purple within; filaments pale blue, anthers yellow; ovary pale green; style violet, 30 Oct., 1938, *Ludlow, Sherriff & Taylor* (holotype, BM).

BHUTAN: Me La, 4350 m., 6 Oct., 1934, *Ludlow & Sherriff* 1001 (BM). Shingbe, Me La, 4200 m., flowers blue; cliff, 16 Sept., 1949, *Ludlow, Sherriff & Hicks* 21193 (BM). Dur Chutsen, Jiu La, 4200 m., 3 Oct., 1949, *Ludlow, Sherriff & Hicks* 19789 (BM). Thimbu Chu, Yale La, 4200 m., 13 Oct., 1949, *Ludlow, Sherriff & Hicks* 17511 (BM). Paro Chu drainage, Kuma Thang, 3900 m., 15 Oct., 1949, *Ludlow, Sherriff & Hicks* 17474 (BM). Ridge of Angduphorang, 4200 m., 16 Sept., 1915, *R. E. Cooper* 4806 (BM).

ASSAM: Orka La, 3900–4200 m., 27 Sept., 1938, *Kingdon-Ward* 14303 (BM).

This distinct species has for long been confused with *G. emodi* Marq. (=*G. amoena* C. B. Clarke). It was first found by Thomson in Sikkim 1857. His specimens are preserved in the Calcutta herbarium, mounted on one sheet, on which 3 small labels in Thomson's hand are attached. One label reading: 'Gentian 14000–15000 ft., 18.10.57', the other: 'Gentian purple-blue, 15000 ft., 18.10.57', and the third: 'undecipherable name Rungbi, 10.57'. Probably they are all collected in the mountains around the Rungbi River. On that same sheet a small specimen of the J. D. Hooker specimen of G. sp. no. 30 (=the true *G. emodi*) is mounted. On this mixed sheet Clarke has written '*G. amoena* Clarke'. So also on the specimen of *G. lacerulata* from the Kurz herbarium. In 'Notes on Indian Gentianaceae' (Journ. Linn. Soc., Bot. 14: 438 (1875)) Clarke gave, without applying any epithet, a short latin diagnosis of 'G.—sp. no. 30, Hook.f. et Th.' This diagnosis is undoubtedly at least partly based on the Thomson specimens of *G. lacerulata*. So f.i. the flower is said to be '$1\frac{1}{4}$-uncialis' a size not attained to in the type collection of *G. amoena*. Later on, when he compiled the description of *G. amoena* for the 'Flora of British India', he altered this to suit J. D. Hooker's plant. Eventually Clarke had discovered that two different species had been mixed in the preliminary diagnosis of G. sp. no. 30. It could also be that the description in the 'Flora of British India' was founded on the proper material simply because Thomson's specimens were not represented in the Kew herbarium. Anyhow, the flower is there given the proper dimensions $\frac{3}{4}$–1 inch. What Clarke intended to do with the Thomson and Kurz plants remains unsettled. No mention is made of them in the 'Flora of British India'.

DISTRIBUTION: Nepal, Sikkim, Bhutan, Assam, S. and SE. Tibet, from 3600–4500 m. Average of 14 reports on altitude above sea-level 4140 m.

9. **G. emodi** *Marq. ex J. R. Sealy* in Bot. Mag. 170: sub t. 230 (1954).

G. amoena C. B. Clarke in Fl. Brit. Ind. 4: 115 (1883).

DISTRIBUTION: Sikkim, Bhutan, S. Tibet. From 4350–5460 m. Average of 9 reports on altitude above sea-level 4830 m. Fig. 2/13–15 (p. 47).

SUMMARY OF THE CLASSIFICATION OF THE SECTION FRIGIDA KUSN.

Subsectio 1, **Monopodiae** *H. Sm.*, subsectio nova.

Axis plantae monopodialis.

TYPUS SUBSECTIONIS: *G. cephalantha* Franch.

Series 1, **Rosulatae** *H. Sm.*, series nova.

Planta radice vel geocormo perenni instructa; rosula perennis conspicua, foliis rosularibus (*G. rigescente* Franch. excepta) nunquam reductis; semen ovatum vel oblongum, testa manifeste reticulata.

TYPUS SERIEI: *G. cephalantha* Franch.

Subseries 1, **Apteroïdeae** *H. Sm.*, subseries nova.

Rami floriferi cauliformes, vulgo erecti; flores plures, saepe apicaliter congesti.

TYPUS SUBSERIEI: *G. cephalantha* Franch.

Subseries 2, **Monanthae** *H. Sm.*, subseries nova.

Rami floriferi uniflori, breves, decumbentes vel ascendentes.

TYPUS SUBSERIEI: *G. szechenyi* Kan.

Series 2, **Ornatae** *Marq. emend. H. Sm.*

SYN. Series *Ornatae* Marq. in Bull. Misc. Inf. Kew 1937: 141, 159 (1937).
Series *Verticillatae* Marq. *l.c.* 141, 157 (1937).

Planta radiculis annuis solum instructa; semen subangulariter oblongum, testa stratu simplici altissime hexagonaliter areolata favum aemulans.

Subseries 1, **Oppositifoliae** *H. Sm.*, subser. nova.

Folia rami floriferi opposita; folia rosularia evoluta vel in squamas reducta.

TYPUS SUBSERIEI: *G. sino-ornata* Balf. fil.

Subseries 2, **Verticillatae** (*Marq.*) *H. Sm.*, comb. nova.

SYN. Series *Verticillatae* Marq. in Bull. Misc. Inf. Kew 1937: 141, 157 (1937).

Folia rami floriferi verticillata; folia rosularia semper in squamas reducta.

TYPUS SUBSERIEI: *G. hexaphylla* Maxim.

Subsectio 2, **Sympodiae** *H. Sm.*, subsectio nova.

Axis plantae sympodialis.

TYPUS SUBSECTIONIS: *G. algida* Pallas

Series 1, **Algidae** *H. Sm.*, series nova.

Planta perennis; testa seminis spongiosa, cellulis cystiformibus vel apertis in stratum inaequaliter crassum, raro alatiformiter aggregatis.

Typus seriei: *G. algida* Pallas

Series 2, **Depressae** *H. Sm.*, series nova.

Planta perennis; testa seminis stratu simplici altissime subhexagonaliter areolata.

Typus seriei: *G. depressa* D. Don

Series 3, **Annuae** *Marq.* in Bull. Misc. Inf. Kew 1937: 141, 165 (1937).

Planta annua; semen ovatum vel ovale, testa distincte vel obsolete reticulata.

Typus seriei: *G. picta* Franch.

The series *Annuae* is heterogeneous and in parts not clearly defined from the section *Chondrophylla* Bunge.

Flora of Peru.*—Mr. Macbride continues his Flora of Peru with accounts of a large number of sympetalous families, including the *Ericaceae*, *Gentianaceae*, *Apocynaceae* (but not *Asclepiadaceae*) and *Convolvulaceae*. He is an ingenious compiler, who misses or omits a good deal of important information. In this part, for instance, one notes on a very rapid survey that the generic name *Gentianella* is not even mentioned, although Dr. Humberto Fabris has already transferred to it some of the Andine species of *Gentiana*; that no mention is made of Mr. P. Taylor's reduction of *Centunculus* to *Anagallis*; while the late Dr. C. A. Donell's new genus *Iseia*, incorporating *Jacquemontia luxurians*, has been altogether missed.

The author's remarks in dealing with critical groups of genera in the *Ericaceae*, *Gentianaceae* and *Apocynaceae*, emphasize the hopelessly fluid condition of generic names and, consequently, of binomials in many difficult families. Each successive botanist can align the taxa in a new pattern, because he has different eyes and estimates of characters. At present it seems rather like a game of spillikins, but we must go on believing that, with time, the best way of all will become obvious to someone with a firm grip on his subject.

N. Y. Sandwith

* *Flora of Peru* (continued). Being Vol. 13, pt. 5, No. 1 (Publication 880), of the Botanical Series of the Field Museum of Natural History, Chicago. By J. Francis Macbride. Pp. 536 + ii. Chicago Natural History Museum Press, 1959. Price $8.50.

Plants of the 1957-58 West African Expedition: I

F. N. Hepper

Introduction

This is the first of several papers which will deal with some of the more interesting plants collected in West Africa, mainly by the writer, between October 1957 and April 1958.

Although the primary object of the expedition was to collect plants in the Northern Cameroons (Adamawa Province), and in part of Southern Cameroons, the opportunity was taken during the 6½ months of the trip to collect in other parts of Nigeria, notably in the south-eastern part of Jos Plateau, and to spend about two weeks in both Ghana and Sierra Leone, as mentioned below. For detailed itinerary see Table 1.

I hope to publish elsewhere papers on the vegetation of the parts of Adamawa Province visited; the present series of papers will deal with the taxonomic and distributional aspects of the plants collected. It is worth noting that most of the extensive Adamawa Province in Northern British Cameroons had hardly been visited for botanical purposes before this expedition, but a very important collection of some 6,000 plants had been made by C. Ledermann in 1908–9 along the present French Cameroons border. Ledermann's specimens were deposited in the Berlin-Dahlem Herbarium and subsequently worked on intensively by German botanists, who described about 300 new species and varieties from this collection, although many of them have since been reduced to synonymy. Almost the entire collection was destroyed during the tragic destruction of the Berlin Herbarium, and as Ledermann appears to have collected most of his plants as unicates, very few duplicates remain in other herbaria. In the following notes I have made a point of indicating plants that were described from Ledermann's specimens and were later re-collected by myself. It is gratifying to record a number of these, but many others still remain to be re-collected both in the lowland forest and in the mountain regions of the Cameroons; many will inevitably remain as imperfectly known species.

Nearly 2,000 gatherings were made in the 1957–58 Expedition and, besides a technical assistant, Benjamin Daramola, who was with me for most of my Nigerian visit, I collected with Mr. R. W. J. Keay and Mr. S. H. Wimbush for a few days each in N. Nigeria. Mr. J. W. F. Chapman, then Forest Officer at Yola, joined me on Mambila Plateau, British Cameroons, and although we did not collect together then, I asked him to collect a few months later when he was to visit the Plateau during the rainy season. As a result of my request about 80 gatherings were forwarded and I include the interesting results in the present series of papers. In Bamenda Province Mr. J. Charter, a Federal Forest Research Officer, and I collected together for 10 days. In Ghana I was kindly taken for a rapid 12-day tour by Dr. J. K. Morton, and during a 12-day visit to Sierra Leone I collected with Mr. C. T. Pyne and Mr. H. D. Jordan.

In British Cameroons (see Maps 1 & 2) the main objects were to collect in little-known regions (Vogel Peak, approx. 8° 25′N., 11° 40′E.; Mambila Plateau, approx. 7°N., 11° 10′E., etc.); to find out whether montane vegeta-

tion exists on Vogel Peak (6700 ft., 2040 m., alt.) ; and to re-collect some of the plants gathered by Ledermann. A few introductory notes follow, on the three main areas in which collecting was carried out in the Cameroons.

TABLE 1.

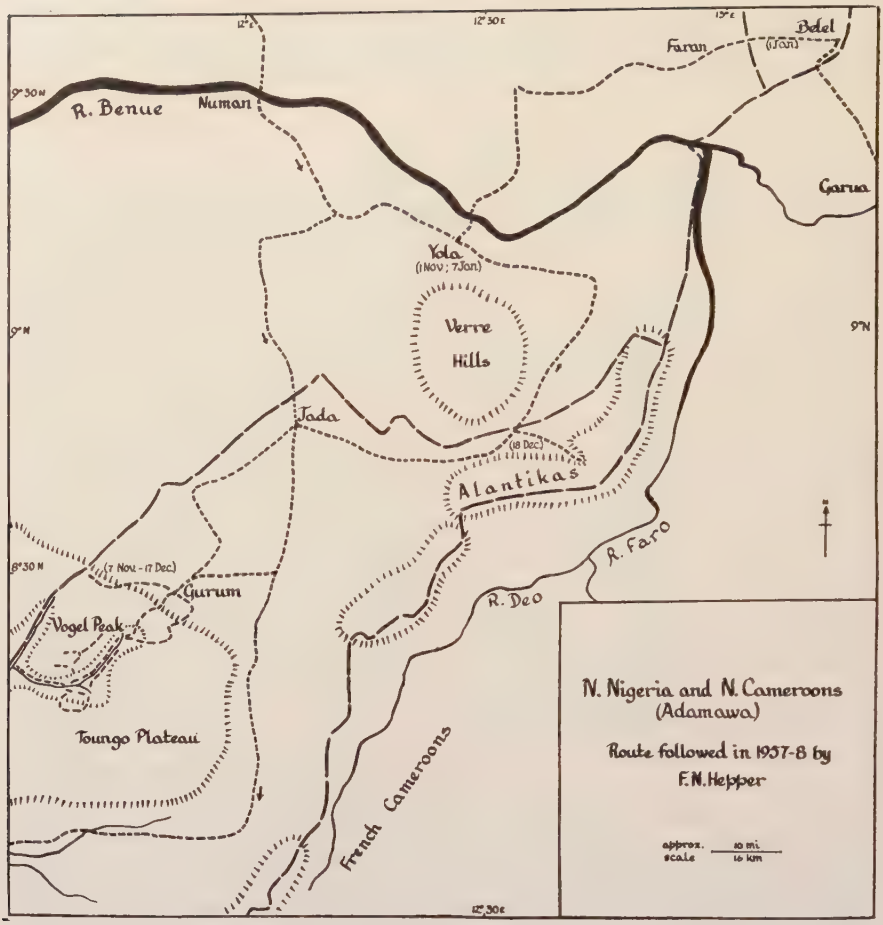
Itinerary of Expedition. (The localities from which the principal collections were obtained are in bold type).

1957	
24 Sept.	*Gran Canaria*
28	*Sierra Leone*
5–7 Oct.	*W. Nigeria*
	N. Nigeria:
7	Ilorin and Bida Div.
8	Bida and Kontagora Div.
9–10	Minna Div.
11–14	Zaria Div.
14–15	Jos Div.
16	Jemaa Div.
16–18	Jos Div.
19–22	**Pankshin Div.**
23	Bauchi Div.
23–24	Pankshin Div.
27–29	Jos Div.
1–4 Nov.	Adamawa Div., Yola Dist.
	British Cameroons (North):
5	Jada Dist.
6 Nov.–16 Dec.	**Vogel Peak area**
18–19	Mapeo Dist. (Alantika Mts.)
25–29	*N. Nigeria*: Yola Dist.
	British Cameroons (North):
31	Malabu Dist.
1958	
1 Jan.	*French Cameroons*: Adamawa Prov.
	British Cameroons (North):
1–2	Bellel Dist.
3	Malabu Dist.
9	Gashaka Dist.
10 Jan.–3 Feb.	**Mambila Plateau**
	British Cameroons (South):
3–11	Nkambe Div.
11	Wum Div.
11–12	Nkambe Div.
13–27	**Bamenda Div.**
28 Feb.–3 Mar.	*E. Nigeria*
7–13	*W. Nigeria*
15–27	*Ghana*
28	*Liberia*
28 Mar.–9 Apr.	*Sierra Leone*

VOGEL PEAK (see Map 1)

Vogel Peak, or Vogelspitze, is marked on many maps and even in small-scale atlases as the highest point (c. 6700 ft., 2040 m.) of a mountainous outlier of the main Cameroons range. On some maps the mountains are called the Schebschi [= Chebchi or Tschebtschi] Mts., but this appears to be an old name that is quite unknown in the district itself and I use the term Vogel Peak area to include the whole of the outlier. The extensive plain south of Yola finishes abruptly at a scarp-slope that runs ESE.–WNW. above the village of Gurum (or Gurumpawo). From the top of the escarpment much of the area can be seen, with the remarkably flat ironstone Toungo (or Kiri) Plateau to the south-east and the steeply rising dissected mountains of Vogel Peak to the south-west. Between them lies the deep valley of the River Kirimi which flows south and west to meet the River Kam flowing on the far western side of Vogel Peak. Still further west are the mountains and small plateau of Tibba which I was unable to visit in the time allotted. However, I was able to make out from aerial photographs a fine forest, which was visited on my suggestion by Mr. J. W. F. Chapman, Forest Officer, and later declared a forest reserve.

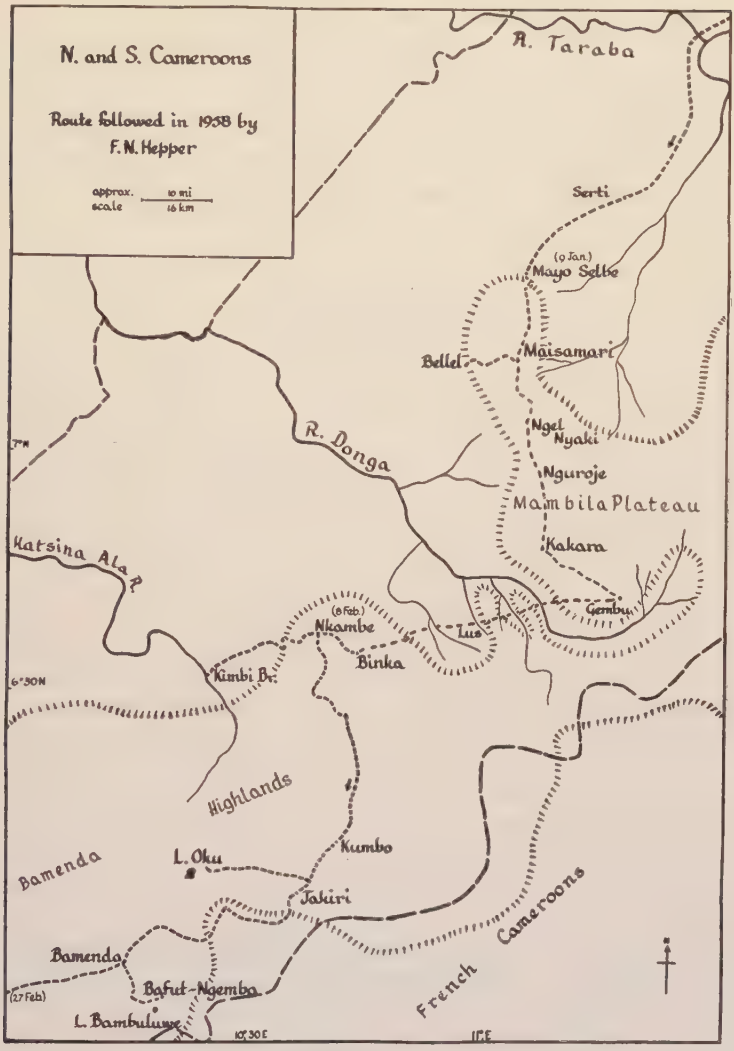
The eastern part of the Vogel Peak area has a very pronounced dry season, but Vogel Peak itself has continuously flowing streams which support fine gallery forest: between the streams is grassland and near the tops the vegetation is short and herbaceous. A sufficient number of montane species was collected to make it possible to say that there exists a 'montane



Map 1.

community' in the sense of Keay in the A.E.T.F.A.T. Vegetation Map of Africa (1959). A spot of mauve indicating vegetation type No. 3 could well be added to the map at approximately 8° 25′ N., 11° 40′E. Further details of the vegetation will be given in a separate paper.

It is difficult to say which is the highest point of the mountain mass for there are several summits that approach the same altitude, and I climbed all of the highest, apparently for the first time on record. I am grateful to Mr. R. G. Miller of the Directorate of Overseas Surveys for his assistance in obtaining copies of aerial photographs of Vogel Peak, which enabled me to locate a way to the tops. Most of the mountain mass is uninhabited and only occasionally visited by Fulani herdsmen. The Kirimi valley, on the other hand, has several small villages such as Gandabari, Dakemi, Gandingi, and Ganglani, with cultivation in the savanna around them. Fulani herdsmen graze their cattle on the Toungo Plateau and along the undulating top of the escarpment above Gurum. The savanna plain north of Gurum is densely populated and intensively cultivated: guinea corn and groundnuts being the principal crops with rice in the swampy places.



Map 2.

Mambila Plateau (see Map 2)

This Plateau lies at the northern end of the Cameroons range of mountains and has a general level of 4500–6000 ft. (c. 1300–1800 m.). The whole area is extensively grazed by cattle and little woody vegetation remains. However, near Nguroje there exists a large patch of forest on a west-facing slope, which is not burnt by the annual fires that sweep across most of the Plateau. The flora is generally montane and similar to that of Bamenda further south. The population is low and cultivation negligible, although there are prospects of considerable developments in the future. Firewood is very scarce and streamside scrub is mostly cut about. The land for fuel plantations was being reserved at the time of my visit so that when these become established the natural woody vegetation may recover and additional habitats for woodland species will be created.

I trekked with carriers across the Plateau from the dry-season road-end at Mayo Selbe to Gembu and thence across the Donga River. South of Mambila Plateau and south-west of the Donga River the country becomes very broken by parallel tributaries in deep valleys, along one of which runs the boundary between Northern and Southern Cameroons. Nkambe Division lies on the Southern Cameroons side of the boundary and it was at Binka, some 40 miles (64 km.) from Gembu, that I joined the road and parted with the carriers.

Southern Cameroons (see Map 2)

Collections were made principally around Nkambe, Kumbo (or Banso), Oku, Jakiri, and in the Bafut-Ngemba Forest Reserve near Bamenda. Most of the localities in which collections were made in the Southern Cameroons were at an altitude of 6000–7000 ft. (c. 1800–2100 m.), with true montane vegetation and patches of evergreen montane forest. Some parts of Bamenda are densely populated and cultivation is extensive; cattle-grazing is widespread and a Livestock Research Farm has been established at Jakiri. *Eucalyptus* plantations are frequent and at Bafut-Ngemba Forest Resrve many species of exotic trees have been introduced.

Acknowledgments

A grant for the Expedition was made by the Trustees of the Percy Sladen Memorial Fund to whom I am very grateful. A similar sum came from the Colonial Office, half of this being contributed by the Nigerian Federal Government, which also generously helped in various other ways. A technical assistant, Benjamin Daramola, was provided by the Nigerian Federal Department of Forest Research for four months to assist with the collection of specimens, and his help was most valuable in often exacting circumstances.

I would also like to record my indebtedness to all the Government officers and others who so kindly assisted with the arrangements, especially the Federal Department of Forest Research, Nigeria (particularly Mr. R. W. J. Keay), and the Department of Forestry, Northern Nigeria. My thanks are also due to the Director of the Royal Botanic Gardens, Kew, who made the expedition possible.

The Collections

Most of the plants collected during the Expedition are represented by four or five sets, one of which is at Kew. Where possible another set of the Nigerian gatherings is being sent to the Forest Herbarium, Ibadan; duplicates of the Ghana plants (under Dr. J. K. Morton's series of A numbers) are at the Ghana Herbarium, University College ; and those from Sierra Leone at the Agricultural Herbarium, Njala. Further duplicates will be distributed to the herbaria at Paris and Brussels. Some beetles were collected for Mr. J. Balfour-Browne of the British Museum (Natural History), and rock samples from Vogel Peak for Dr. J. C. Pugh of King's College, London.

The following notes are arranged alphabetically; they are not in systematic order as it has not been possible to work out the collection as a whole. The term West Africa here refers to the area of the revised edition of the 'Flora of

West Tropical Africa', i.e. British/French Cameroons boundary, then north to, and west along, the 18°N. latitude. Political changes are taking place so rapidly in West Africa that the countries mentioned may have changed their names or affiliations by the time this paper is published. So the names by which the countries were known in 1957–58 (during the Expedition) will be used, as these mostly coincide with those adopted for the revised edition of the 'Flora of West Tropical Africa'. The Southern Cameroons is here given as British Cameroons (South), and the Northern Trusteeship Territory as British Cameroons (North).

CAMPANULACEAE

Lightfootia hirsuta (*Edgew.*) *E. Wimm. ex Hepper*, comb. nov.

Cephalostigma hirsutum Edgew. in Trans. Linn. Soc. 20: 81 (1851). Type: India, Banasar, *Edgeworth* 252 (K!, holotype).

C. perotifolium Hutch. & Dalz., Fl. W. Trop. Afr. 2: 191 (1931), *non Wahlenbergia perotifolia* Wight & Arn. (1834).

Northern Nigeria: Plateau Prov., Dutsen Lamba (hill), 2 miles east of Gindiri, c. 1130 m. alt., very rocky hill, in savanna woodland with *Anogeissus*, fl. & fr. 21 Oct. 1957, *Hepper* 1100: slender erect herb with yellow flowers, deeply divided petals. Two plants (1100 *a*) collected with blue flowers half the size of the yellow.

British Cameroons (North): Adamawa Division, Vogel Peak, Silang, slopes of flat-topped Djé, c. 1220 m. alt., in rough ground partly shaded by trees near stream, fl. & fr. 14 Nov. 1957, *Hepper* 1341: erect herb c. 10 cm. high, leaves dull greenish beneath, lower ones often purple, inflorescence slender, spreading, corolla deeply divided, deep blue.

I am grateful to Prof. F. E. Wimmer for his permission to publish this and the following new combinations, which he had made in manuscript on a number of sheets at Kew, as they result from his extensive research into this family.

In West Africa this species has only been collected a few times from Ghana and from Jos Plateau in Northern Nigeria, although its range extends eastwards as far as India.

Lightfootia ramosissima (*Hemsley*) *E. Wimm. ex Hepper*, comb. nov.

Cephalostigma ramosissimum Hemsley in Fl. Trop. Afr. 3: 472 (1877); Hutch. & Dalz., Fl. W. Trop. Afr. 2: 191. Type: Cameroon Mt., *Mann* 1333 (K!, holotype).

Although this species was not collected during the 1957–8 Expedition it is convenient to make the new combination here.

Lightfootia abyssinica *Hochst. ex A. Rich.* var. **tenuis** *Oliv.* in Journ. Linn. Soc. Bot. 21: 401 (1885).

British Cameroons (North): Adamawa Division, Mambila Plateau, c. 1670 m. alt., fl. & fr. July 1958, *Chapman* 59.

L. abyssinica has not been recorded from West Africa before and *Chapman* 59 matches best the var. *tenuis* in this very variable species.

CONVOVULACEAE

Cuscuta campestris *Yuncker* in Mem. Torrey Bot. Club 18: 138, fig. 14 (1932).

British Cameroons (South): Bamenda Prov., Kumbo [=Banso], by R. Wi to south of town in felled *Eucalyptus* plantation, now open and with dense herbaceous growth, c. 1680 m. alt., 14 Feb. 1958, *Hepper* 1980: parasite on *Triumfetta* sp. matted and twisted stems in abundance, bright orange-yellow, leafless, buds only green, flowers with translucent whitish corolla, anthers yellowish.

C. campestris is a native of America and is now a very widespread parasitic weed in many of the warmer parts of the world including much of Africa, but it has never before been recorded from West Africa.

Dichondra repens *J. G. & R. Forster*, Char. Gen.: 40, t. 20 (1776).

British Cameroons (South): Nkambe Division, Lus, 20 miles (32 km.) NE. of Nkambe in rocky ground by rest house with *Senecio abyssinicus* and *Sonchus rarifolius*, c. 760 m. alt., fl. & fr. 4 Feb. 1958, *Hepper* 1861: prostrate creeping herb, rooting at nodes, stems terete, dull purplish leaves greyish hairy beneath, flowers horizontal, fruit reflexed on to ground, hairy, corolla pale green, anthers dull purplish. Bamenda Division, Oku, inside Fon's Palace between stones at base of the throne platform, c. 2000 m. alt., fl. & fr. 17 Feb. 1958, *Hepper* 2024: trailing herb rooting and branching frequently and becoming matted, pedicels reflexing and embedding fruit in soil.

It seems that *Dichondra repens* has been introduced into the Cameroons and it is the only country in West Africa where it has so far been recorded. Both of the above gatherings came from man-made habitats, yet in remote places a long way from a motor road, although Oku has recently had a road made to it. Previous records came from Cameroon Mountain and Bamenda.

LOBELIACEAE

Lobelia sapinii *De Wild.* in Bull. Jard. Bot. Brux. 3: 261 (1911).

L. ledermannii Schltr. in Engl., Bot. Jahrb. 57: 619 (1922).

British Cameroons (North): Adamawa Division, Vogel Peak, above Jangla Yobi village, amongst rocks where grasses not too dense, c. 860 m. alt., fl. & fr. 28 Nov. 1957, *Hepper* 1484: erect herb (with a range of population (2–) 15–20 cm. high), stems and leaves mauve (fresh plants dark purple-green leaves and paler beneath, older plants lose greenness), stems 3-angled; corolla bright blue with 2 rows of dark dots across lower lip.

The types of *L. ledermannii* Schltr. came from the French Cameroons not far to the south-east of Vogel Peak where the new material was collected. Professor Wimmer regards this species as conspecific with *L. sapinii* De Wild. The only other West African records are two from N. Nigeria: Anara F.R., Zaria, *Keay in F.H.I.* 5465, and the following:

Northern Nigeria: Plateau Province, Naraguta, in forest along stream, shady, c. 1175 m. alt., fl. 18 Oct. 1957, *Hepper* 1072: erect annual 2–20 cm. high, leaves pale green above, paler along midrib and nerves, purplish beneath; flowers with lower lip blue, upper lip very pale blue.

Monopsis stellarioïdes (*Presl*) *Urb.* var. **schimperiana** (*Urb.*) *E. Wimm.* in Engl., Pflanzenr. IV. 276b: 704 (1953).

British Cameroons (South): Bamenda Prov., Jakiri, Livestock Research Farm, in muddy and rocky ground with trickling water and tussocks of grass, c. 1780 m. alt., fl. & fr. 13 Feb. 1958, *Hepper* 1957: weak straggling herb, c. 30 cm. long, stem ± square, furrowed; corolla yellow inside, dark crimson-purple outside, 2 lower lobes with anther tube between them, the 2 upper lips outlined with pale brown.

Only one collection of this plant had previously been recorded in British Cameroons and that came from Cameroon Mt. itself by Maitland (No. 1087). It is widespread on the mountains of eastern Africa and it is interesting to record its presence in the Cameroons hinterland where it had previously only been collected on the French Cameroons side by Ledermann (Nos. 1853; 5941).

PODOCARPACEAE

Podocarpus milanjianus *Rendle* in Trans. Linn. Soc., ser. 2, Bot., 4: 61 (1894).

British Cameroons (North): Adamawa Division, Vogel Peak, Jobdi Hill above Jangla Yobi, c. 1540 m., upland stream-side at col near our camp; stream flows throughout dry season, 1 Dec. 1957, *Hepper* 2726: large tree with grey-green foliage.

The presence of this *Podocarpus* on Vogel Peak is of considerable interest in that it is a typically montane species. Vogel Peak is an outlier of the main Cameroons range of mountains and one of the objects of the Expedition was to find out whether montane vegetation exists on its summit, and records of other species collected also prove the existence of montane vegetation in the area. *Podocarpus milanjianus* has been recorded previously from only a few places in West Africa in Bamenda Province, almost exactly 200 miles (320 km.) south of Vogel Peak, but now it may be found on Mambila Plateau which lies in between the two known localities for the tree.

SALICACEAE

Salix ledermannii *Seemen* in Engl., Bot. Jahrb. 45: 204 (1910).

S. kamerunensis Seemen, *l.c.* 205 (1910).
S. adamauensis Seemen, *l.c.* (1910).

Northern Nigeria: Plateau Prov., Gindiri, at edge of R. Lere, sandy, quite common there, c. 1070 m. alt., ♂ & ♀ fl. 19 Oct. 1957, *Hepper* 1080: erect-branched shrub or small tree but lacking trunk, reddish brown twigs, leaves grey-pubescent beneath, greener above; male catkins with yellow anthers, female collected from nearby tree, green. Naraguta, 2 miles north of village, in stream amongst rocks and sandbanks, a few plants here, c. 1130 m. alt., fr. 28 Oct. 1857, *Hepper* 1171: erect, several-stemmed shrub c. 3 m. high, leaves white-glaucous beneath, female in fruit.

British Cameroons (North): Adamawa Division, Mambila Plateau, Maisamari, stream bank on undulating plateau grazed by cattle, streams in small deeply eroded beds crossing plateau and mostly free from cattle activity: with *Cyathea* sp., *Osmunda regalis*, *Mussaenda arcuata*, *Syzygium* sp., *Sium repandum*, c. 1400 m. alt., fr. 13 Jan. 1958, *Hepper* 1657: shrub or small tree c. 3 m. high with numerous erect straight branches, older stems grey-green, youngest pink, with white wool, leaves dark green above and slightly woolly, grey or almost white beneath; mature fruit yellowish, seed white-woolly.

I am very grateful to Mr. R. D. Meikle for kindly confirming the identification of my specimens and for his views on the synonymy of this species. Although Seemen described at the same time three closely related species of *Salix* from Ledermann's collections only *S. ledermannii* has been taken up: the names *S. kamerunensis* and *S. adamauensis* have not been used. When Mr. Meikle worked on *Salicaceae* for the revised edition of the 'Flora of West Tropical Africa' he considered the descriptions of all three species and in the absence of the type-specimens (which were destroyed at Berlin) deferred his opinion on *S. kamerunensis* and *S. adamauensis* and continued to use the name *S. ledermannii* for these lanceolate-leaved willows. Now that further gatherings have been made from the same region in which Ledermann collected, it is possible to see that there is a considerable variation which does not justify more than one species: thus *S. kamerunensis* and *S. adamauensis* can become synonyms of *S. ledermannii* Seemen.

SANTALACEAE

Thesium tenuissimum *Hook. f.* in Journ. Linn. Soc., Bot. 6: 19 (1862).

British Cameroons (North): Adamawa Division, Vogel Peak, c. 1590 m. alt., exposed almost dried-up rock crevice on top of hill, fl. 28 Nov. 1957, *Hepper* 1491: subshrub c. 25 cm. high, lower stem brown, upper green; young ovary yellowish, perianth spreading above and creamy white inside, 5-lobed almost to base, developing ovary green, hardly reticulate when fresh.

T. tenuissimum has been recorded from four widely separated mountains in W. Africa, i.e. Bintumane Peak (Sierra Leone), Nimba Mts. (Ivory Coast), Cameroon Mt. and Clarence Peak (Fernando Po); now Vogel Peak can be added to this list.The species has been collected at altitudes ranging from 1,500 m. to 3,660 m. but it is clearly a plant of the montane element and another one to confirm the presence of this type of vegetation on Vogel Peak.

Flowers of this specimen show very small swollen triangles at the base of and between the perianth lobes, and in this character they approach a specimen from N. Nigeria (*Lely* 66, K) which has minute appendages in that position. *Lely* 66 has been determined as *T. leucanthum* Gilg and I cited it as such in the revised edition of the 'Flora of West Tropical Africa' Vol. 1: 666, for it is an excellent match with the type (*Baum* 218) of that species preserved at Kew. Further examination of the Kew material of *T. tenuissimum* has shown that, whilst many flowers lack the thickening, some possess it and the presence or absence of the swellings or minute appendages is not as absolute a distinction between these species as I thought at first. However, the profusely branched habit of *Hepper* 1491 is typical of *T. tenuissimum* and contrasts with the long almost simple stems of *T. leucanthum*.

SCROPHULARIACEAE

Alectra sp. nr. **capensis** *Thunb.*, Nov. Gen. Pl.: 32 (1784).

Northern Nigeria: Plateau Prov., Naraguta, one mile (1·6 km.) north of the village in wet grass field, c. 1130 m. alt., fr. 28 Oct. 1957, *Hepper & Wimbush* 1169: erect, strict, unbranched, hispid herb 15–30 cm. high; mostly in fruit, no flowers seen, withered corolla pale pink; leaves pale green, midrib and stem tinged purplish.

This plant seems to be near to *A. capensis*, but it is also allied to *A. basutica* (Phillips) Melchior and *A. asperrima* Benth. It is similar to an un-named plant of which there are several gatherings at Kew from eastern Africa, and a thorough revision is needed of this group before a final name can be given to this Nigerian gathering. At my request Mr. S. H. Wimbush kindly returned to the locality in 1958 in the hope of finding flowering material, but although he was able to locate the plant it was again in fruit.

Bacopa hamiltoniana (*Benth.*) *Wettst.* var. **angustisepala** *Hepper*, var. nov.; a var. typica lobis calycis angustioribus differt.

Simple erect herb 6–19 cm. high, glabrous, with numerous roots from lower nodes; leaves up to 2 mm. broad, linear, neither narrowed nor auricled at the base, subacute at the apex, heavily punctate; 2 bracteoles at base of calyx linear, 2–4 mm. long, flowers solitary, sessile or subsessile with pedicel up to 1 mm. long, calyx-lobes unequal, the adaxial longest, lanceolate, up to 4·5 mm. long and 1·5 mm. broad, the abaxial ovate, 2·5 mm. long and 1·5 mm. broad, the other lanceolate up to 2 mm. long and 1 mm. broad; corolla about 3 mm. long.

NORTHERN NIGERIA: Niger Prov., Guma forest outlier, 38 miles (c. 60 km.) by road east of Minna, beside path through farmland, fl. & fr. 9 Oct. 1957, *Hepper* 976 (holotype, K): erect annual herb, stems and leaves slightly fleshy; flowers pale blue.

This variety is easily distinguished from typical *B. hamiltoniana* by the narrower, at the most about twice as long as broad, calyx-lobes, which do not obscure the fruit at maturity. The leaves are also narrower than is usual in var. *hamiltoniana*.

Diclis ovata *Benth.* in Hook., Comp. Bot. Mag. 2: 23 (1836).

BRITISH CAMEROONS (North): Mambila Plateau, Maisamari to Bellel, on steep open moist bank beside path in shade beneath grasses above, 1540 m. alt., fl. & fr. 18 Jan. 1958, *Hepper & Daramola* 1710: prostrate slender herb, 10–20 cm. long, growing up the slope, stems and leaves pale green, pedicels ± erect, corolla with lower lip white, upper lip and tube heavily streaked reddish, tip of spur yellowish, fruit green turning brown, seeds brown. Gembu, Forestry Nursery, weed in moist soil, 1620 m. alt., fl. & fr. 29 Jan. 1958, *Hepper* 1813: small erect herb 4–10 cm. high, glandular-viscid stems; pedicels erect, often reflexed in fruit, corolla whitish, upper lip and tube marked yellow-brown, spur yellowish.

The genus *Diclis* must now be added to the West African flora with the species *D. ovata*. This species was described from Madagascar and has also been recorded from Mauritius, Nyasaland, Northern and Southern Rhodesia, Angola, Tanganyika, Kenya, Uganda and Ethiopia. At Kew there is a specimen (*Preuss* 539) merely labelled 'Kamerun', which had previously been overlooked and might have been collected in either British or French Cameroons.

Ilysanthes rotundifolia (*L.*) *Benth.* in DC., Prodr. 10: 420 (1846).

I. rotundata Pilger in Engl., Bot. Jahrb. 45: 214 (1910).

BRITISH CAMEROONS (North): Mambila Plateau, Ngel Nyaki, c. 1650 m. alt., muddy area beside stream where path crosses near village and cattle drink, fl. 20 Jan. 1958, *Hepper* 1713: trailing prostrate herb up to 20 cm. long, stems square, reddish at nodes, clasping leaves ± 5-nerved, flowers few, corolla whitish, tube blue, lips with bluish patches, calyx-lobes spreading in flower.

BRITISH CAMEROONS (South): Bamenda Prov., Jakiri, Livestock Research Farm, c. 1780 m. alt., muddy and rocky ground with trickling water and odd tussocks of grass, fl. 13 Feb. 1958, *Hepper* 1956: prostrate trailing herb occasionally rooting, stems soft, rather angular, where growing in favoured place becoming very lush and matted, flowers few toward apex of stem; corolla white with blue or mauve markings.

In Kew Herbarium there is a fragment of the type specimen (*Ledermann* 1849) of *I. rotundata* Pilger from French Cameroons, which matches material of *I. rotundifolia* (L.) Benth. There is no doubt that Pilger's species must be treated as a synonym of *I. rotundifolia* (L.) Benth., although it would appear that the similarity of epithet is entirely co-incidental. Only one gathering of this species had previously been made in British Cameroons (*Keay in F.H.I.* 28380), but I found it reasonably common in suitable habitats such as wet flushes.

Stemodiopsis humilis *Skan* in Fl. Trop. Afr. 4(2): 316 (1906).

BRITISH CAMEROONS (North): Adamawa Division, Mapeo, Alantika Mts., 760–1070 m. alt., small cracks in large boulders on steep hillside, fl. & fr. 18 Dec. 1957, *Hepper* 1601: small tufted herb c. 10 cm. high, almost dried up, upper leaves beginning to shrivel, apparently perennating by small shoots on tough base in rock crack, some plants strongly purple-tinged on stems and leaves, others entirely green; corolla greenish-yellow, lower lip with 3 broad stripes down it, throat apparently closed.

The occurrence of this genus in West Africa is now recorded for the first time. It is remarkable how constant is the habitat of *S. humilis*, for most of

the collectors in eastern Africa record their plants as growing in small crack in large boulders. My own collection was obtained from two very large boulders about 1,000 ft. (300 m.) vertically apart up the very steep mountainside overlooking Mapeo in dry savanna country. Several specimens in the East African covers of *Stemodiopsis* at Kew were un-named as 'sp.', but I can see no reason why these cannot be called *S. humilis*. The distribution can now be given more accurately and fits in well with the new West African record: Sudan Republic, Uganda, Kenya, Tanganyika, Nyasaland, Southern Rhodesia and Mozambique. The glabrous *S. buchanani* Skan has been recorded from Kenya, Tanganyika, and Northern Rhodesia. *S. rivae* Engl. still appears to be known only from the type-collection in Somaliland.

Several plants were raised from seeds of *Hepper* 1601 at Kew during 1959 and good flowering material was obtained.

VIOLACEAE

Viola abyssinica *Steud. ex Oliv.* in Fl. Trop. Afr. 1: 105 (1868).

British Cameroons (South): Bamenda Division, Bafut-Ngemba F.R., in high forest compartment 12, c. 2150 m. alt., fl. & fr. 20 Feb. 1958, *Hepper* 2087: wide-trailing herb covering ground over a limited area, prostrate stems covered by humus and enclosed in white fragile sheath, rooting at nodes and branched, upper stems above humus slightly angular, dark green; in fruit, mature fruit spreading, although flowers searched for carefully none found and suspect this clump of plants is cleistogamous. One plant found in compartment 31 with flowers, pale mauve, lower lip heavily veined in purple.

Cleistogamy is well-known in species of *Viola* in temperate regions and R. E. Fries has recorded it (in Act. Hort. Berg. 8: 3 (1923)) for the tropical African species, *Viola eminii* (Engl.) R. E. Fries. The plant of *V. abyssinica* collected in the Cameroons also clearly exhibits the phenomenon. It was growing in deep shade and had assumed a wide-spreading habit with rather long internodes and almost glabrous leaves. By contrast the chasmogamous plant has short internodes and a compact habit with the leaves conspicuously pubescent. Cleistogamy may be linked with habitat for the chasmogamous plant was growing in a much more open position.

Rinorea ardisiiflora (*Welw. ex Oliv.*) *Kuntze*, Rev. Gen. Pl. 1: 42 (1891).

Sierra Leone: Northern Prov., Kambia, secondary forest at edge of large laterite pan, fl. 5 Apr. 1958, *Hepper* 2588: large spreading shrub with numerous semi-pendulous inflorescences; rhachis, pedicels, calyx, corolla and anthers all pure white, petals reflexed.

R. ardisiiflora is rare in West Africa and this is only the third known gathering, and the first from Sierra Leone: the others came from French Guinea and Ghana. It also occurs in French Cameroons, Gabon, Congo and Angola. The pure white inflorescences are very beautiful and the shrub might be worth cultivating as an ornamental.

Fungi venezuelani: IV*

AGARICALES

R. W. G. Dennis

The collections described below were the main object of an expedition financed in 1958 mainly by the Percy Sladen Trust, with assistance also from the Shell Company of Venezuela. Valuable facilities were generously provided also, in Caracas by Dr. T. Lasser and in Mérida and Mucubaji by Dr. R. Vilorio Diaz, to whom and to their staffs much of the success of the expedition is due.

A great part of the agaric material has been seen by Dr. R. Singer, who has most kindly given me the benefit of his wide experience of South American *Agaricales*, as well as determining the species of *Callistosporium*, *Crepidotus*, *Crinipellis*, *Favolaschia* and *Galerina* cited. He has also undertaken to deal elsewhere with the species of *Pluteus*, *Russulaceae* and *Boletaceae*. A few species of *Agaricus sensu stricto* are being described by Dr. P. Heinemann while Mr. D. A. Reid is dealing with a few cyphelloid genera.

As far as the *Agaricales* are concerned one can recognise a number of rather well defined floristic regions within the parts of Venezuela visited by the writer**.

(1) Forests and plantations of the low country with summer and autumn rains, between sea level and about 850 m., localities Chichiriviche and Guatopo. Here the flora seems similar to that of Trinidad and is characterised by the abundance of small species of *Marasmius*. An easily recognised index species is *M. cladophyllus* Berk.

(2) The valley of Caracas and surrounding hills with rather dry forest about 900–1300 m., localities Caracas and its environs, Mariposa, El Hatillo, Los Guayabitos, Cortada del Guayabo. The fungus flora seems to have surprisingly little in common with regions 1 and 3 but the whole area has been so much disturbed by human activity that it is difficult to form an opinion of its original character.

(3) The cloud-forests of the Sierra de la Costa, about 1500–2500 m., with the forests of the Sierra Nevada de Mérida, localities La Silla, El Avila, El Junquito, La Mucuy and presumably also Rancho Grande. Unfortunately I was unable to revisit the last named interesting forest in 1958 and the few species collected there in November 1949 had little in common with those found in the eastern parts of the Sierra de la Costa in June–August 1958. Characteristic species of this region are *Mycobonia flava* (Berk.) Pat. and *Hymenogloea papyracea* (Berk. & Curt.) Sing. It seems likely that most of Fendler's collections also came from the forests of this region.

(4) The small, cold, wet woodlands, dominated by *Polylepis sericea* and *Gynoxis moritziana*, in corries of the Sierra de Santo Domingo at 3400–3800 m., localities Laguna Negra, where the forest is well developed and

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* Continued from Kew Bull. 14: 458 (1960).

**For sketch-maps showing Dr. Dennis' localities see Kew Bull. 14: 421, 422 (1960).

dense, and the corrie at the head of the Mucubaji valley, where the forest is sparse and open. Laguna Negra in particular has a rich agaric flora of temperate facies and with marked Magellanic affinities. A characteristic species is *Favolaschia antarctica* (Speg.) Sing.

(5) The open paramos at about 3400–4000 m., moraines and rocky hillsides, wet and liable to frost at night, dominated by *Espeletia schultzii* and its allies and studied in the Sierra de Santo Domingo around Laguna Mucubaji. Here there is a strong north temperate and even arctic-alpine element in the fungus flora, characteristic species are *Omphalina luteovitellina* (Pilat & Nannf.) M. Lange and *O. ericetorum* (Fr.) M. Lange. This paramo is used as a cattle range which probably accounts for the presence there of several cosmopolitan coprophilous fungi.

HYGROPHORACEAE

Hygrophorus cantharellus (Schw.) Fr., Epicrisis: 329 (1838).

Pileus up to 7 mm. across, convex, flat at the disc, Scarlet, dry, covered with minute, concolorous, fibrillous squamules; flesh thin, concolorous except in the pith of the stipe which is concolorous with the lamellae; lamellae subdistant, deeply decurrent, whitish then Maize Yellow; stipe equal, about 20–25 × 1 mm., Scarlet, dry, solid. Basidia 4-spored; spores mostly elliptic-cylindric, a minority broadly ovoid, (6)–7–9 × (4)–5–6μ; no cystidia.

About 800 m., scattered amongst small mosses on a roadside bank, Guatopo, Edo. Miranda, 22.6.1958, *Dennis & Aristeguieta* 1091; about 900 m., in short grass, Caracas, Dto. Federal, 17.6.1958, *Dennis & Aristeguieta* 1091A.

Hygrophorus hypohaemactus Corner in Trans. Brit. mycol. Soc. 20: 180 (1936).

Pileus convex, then expanded, 15 mm. diameter, Scarlet Red, extreme margin whitish to yellow, not striate, surface glutinous and shining; flesh thin, concolorous with pileus, hygrophanous; lamellae moderately spaced, of 2 lengths, adnexed, 2 mm. wide, white; stipe equal, 23 × 2·5 mm., solid, becoming hollow, Apricot Orange with yellow base or yellow throughout, viscid. Basidia dimorphic, the larger about 35 × 6μ, the smaller about 20–25 × 4μ, all 4-spored; spores subglobose, the larger 7–9 × 5·5–7·5μ with oily contents, the smaller 4·5–5 × 3·5–4μ, with clear vacuolate contents. A few simple or branched thin-walled hyphae project from the gill edge. Fig. 1.

About 900 m., Botanic Garden, Caracas, Dto. Federal, 14.7.1958, *Dennis* 1667; about 1000 m., Mariposa, near Caracas, 20.6.1958, *Dennis & Aristeguieta* 1667A.

The two sizes of spores are shed together and occur in about equal numbers in the white spore print. Clamp connections are present on the slender hyphae of the gelatinous layer. The pure white lamellae and glutinous scarlet pileus make this a most distinctive species.

Hygrophorus nigrescens (Quél.) Quél., Flore mycol. France: 254 (1888).

Pileus conical, then expanded with a persistent obtuse umbo, up to 6 cm. diameter, Orange Chrome, shading to Apricot Yellow, blackening when bruised, dry, silky-fibrillose, not striate; flesh thin, whitish under the cuticle and in the inner layers of the stipe, blackening when cut; lamellae adnexed or separating free, ventricose, 11 mm. wide, moderately spaced, of 2 lengths, blackening when bruised; stipe equal, up to 75 × 10 mm., hollow, Pinard Yellow to Apricot Yellow with Orange Chrome fibrils, base white, blackening when bruised. Gill-trama contains numerous lacticiferous hyphae up to 10μ wide with oily blackening contents; basidia 4-spored, 40 × 9–10μ; spores elliptic-cylindric, 8–9·5 × 5–6μ; no cystidia.

c. 2200 m., on soil towards the upper limit of the cloud forest, La Silla, Dto. Federal, 4.7.1958, *Dennis* 1140.

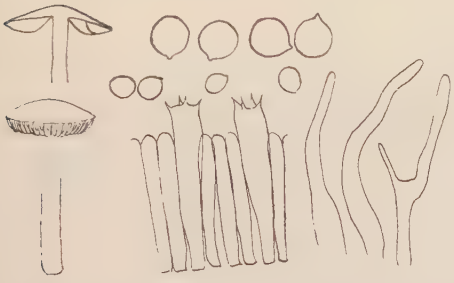


FIG. 1. *Hygrophorus hypohaemactus*. Hymenium, spores and marginal hairs × 660.

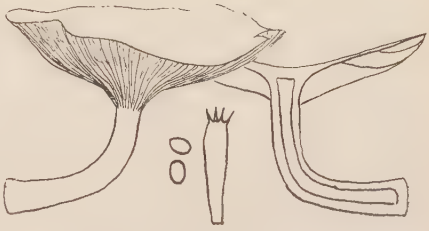


FIG. 2. *Clitocybe pleurotus*. Basidium and spores × 660.

Hygrophorus nigrescens var. **brevisporus** *Dennis*, var. nov. a typo sporis subglobosis 6–8 × 5–6μ recedit, *Dennis* 1077 (typus).

Pileus acutely conical, about 3 cm. diameter, Grenadine Red, surface loosely fibrillose and readily blackening, not striate; flesh thin, Scarlet Red in pileus, Strontian Yellow in stipe; lamellae adnexed, ventricose, 5 mm. wide, cream colour, almost white at the margin, blackening when touched; stipe equal, 75 × 4 mm., Citron Yellow above, flushed orange below, white at the base, blackening when handled, dry, fibrillose, hollow. Basidia 4-spored, 30–35 × 7–8μ; spores subglobose, 6–8 × 5–6μ; no cystidia.

About 1000 m., Mariposa, near Caracas, 20.6.1958, *Aristeguieta*.

This collection differs from *Dennis* 1140 not only in its more slender stature but also in its subglobose spores, which recall those of *H. erinaceus* Pat. It cannot be that species, however, if Patouillard correctly described the lamellae as decurrent. *Thwaites* 813 (the type of *H. conicus* var. *peradenyca* Sacc.) differs in its light yellow pileus.

Hygrophorus parvulus Peck in 28th Report on New York State Museum 50 (1876).

Pileus convex, then expanded with a low umbo, up to 3 cm. diameter, varying from Apricot Yellow to Cadmium Yellow and Zinc Orange,

translucently striate; flesh thin, concolorous, hygrophanous, unchanging; lamellae subdistant, of 2–3 lengths, adnate with a decurrent tooth, pale ochraceous buff, 3·5 mm. broad; stipe equal, hollow, smooth, Apricot Yellow to Wax Yellow, 2–3 mm. thick. The surface of stipe and pileus alike is slippery but not viscid and no glutinous layer can be detected in sections of either; basidia 4-spored; spores elliptic-cylindric, 5–7 × 3–4μ; no cystidia. 2000 m., on bare soil in cloud-forest, El Avila, Dto. Federal, 17.6.1958, *Dennis* 1056.

This differs only in colouring from *H. ceraceus* (Wulf ex Fr.) Fr., as interpreted by modern European authors, indeed one is inclined to wonder if *H. parvulus* be more than a variety of *H. ceraceus*. The latter, in Europe, however, is a species of short grass whereas *H. parvulus* is reported to grow on woodland humus. This ecological character, combined with the brighter colouring of *H. parvulus*, induces me to refer *Dennis* 1056 to that species.

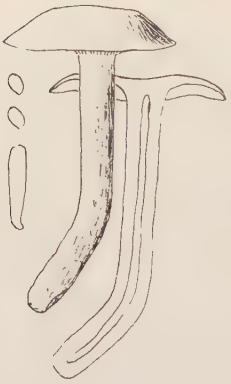


Fig. 3. *Clitocybe espeletiae*. Basidium and spores × 660.

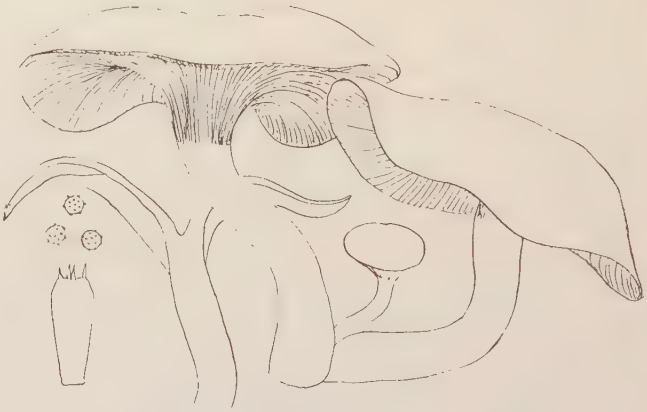


Fig. 4. *Clitocybe andina*. Basidium and spores × 660.

TRICHOLOMATACEAE

Clitocybe espeletiae *Dennis*, sp. nov.

Pileus subcarnosus, 3 cm. latus, e convexo centro depressus, isabellinus, glaber, udus, margine saepe albicans; caro hygrophana, concolor, odore farinaceo; lamellae confertae, lineares, 2 mm. latae, albidae, postice adnatae; stipes aequalis, flexuosus, fistulosus, pileo subconcolor, albido-fibrillosus, 4–5 cm. longus, 4–5 mm. crassus; sporae ellipticae, vix amyloideae, hyalinae, 3·5–4 × 2·5μ; basidia tetraspora, 16–17 × 4μ. Fig. 3.

Hab. 3560 m., subcaespitosa in caudicis emortuis *Espelatiae schultzii*, Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 23.7.1958, *Dennis & Buza* 1716 (typus).

There are no cystidia and though a very few apparent conducting elements occur in the trama they do not permeate the hymenium. The gill-trama consists of compact subparallel hyphae, 2–2·5μ wide, yellow in Melzer's reagent; similar rather loosely interwoven hyaline hyphae form the pileus-surface.

Clitocybe andina *Dennis*, sp. nov.

Pileus carnoso-membranaceus, 6 cm. latus, e convexoumbilicato infundibuliformis, glaber, pallide luteus ('Cream Buff–Colonial Buff' Ridgway); caro junquillea ('Primuline Yellow'), mitis, inodora; lamellae confertae, cremeae, 3–4μ, latae, valde decurrentes; stipes aequalis, solidus, 4 cm. longus, 5–7 mm. crassus, luteus vel cinnamomeus ('Honey Yellow–Cinnamon'), glaber; sporae subglobosae, asperulae, hyalinae, 3·5–4 × 4μ, vix amyloideae. Fig. 4.

Hab. 3440 m., caespitosa, in silvis, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 1.8.1958, *Dennis* 1777 (typus).

The gill-edge is fertile and there are no cystidia. The pileus-surface consists of rather loosely woven hyphae 3–5μ wide, hyaline. This fungus evidently belongs in section *Eu-lepistae*, near *C. flaccida* (Sow. ex Fr.) Kummer, but differs in colouring from any I have seen.

Clitocybe pleurotus Sing. in Sydowia 6: 182 (1952).

Pileus about 4 cm. diameter, becoming concave, light ochraceous buff, darker at the margin, finely striate when moist, smooth, dry; lamellae crowded, 3 mm. broad, whitish to pale ochraceous buff, of three lengths, adnate; stipe about 25 × 3 mm., slightly enlarged at the base, Ochraceous Buff, smooth, slightly fibrillose, hollow; flesh thin, concolorous, tough and leathery, smell mealy when cut, taste none. Spores broadly elliptical, non-amyloid, 4–4·5 × 2·75–3μ; basidia 4-spored, 15 × 5μ; no cystidia; pileus surface formed of parallel, smooth, thin-walled, nonencrusted, hyaline hyphae, 5–6μ wide. Fig. 2, p. 69.

3440 m., on dead wood in forest, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis* 1750.

Tricholomopsis elegans *Dennis*, sp. nov.

Pileus carnoso-membranaceus, 7·5 cm. latus, e convexo explanato-umbonatus, e sericeo glaber, sulphureus ('Ochraceous Buff–Primuline Yellow' Ridgway), margine luteus et substriatus primitus involuto et pruinoso; caro lutea, odore et sapore vix notabili; lamellae confertae, 7 mm. latae, luteae dein ochraceae, postice adnatae, acie dentatae; stipes aequalis, pileo concolor, 8·5 cm. longus, 8 mm. crassus, apice furfuraceus; sporae subglobosae, vix amyloideae, 4·5–5 × 4μ; cheilocystidia vesiculosa, 9–12μ diam.

Hab. 800 m., in silvis frondosis, Guatopo, Edo. Miranda, 27.6.1958, *Dennis* 1113 (typus).

The gill-edge of mature specimens is much eroded but appears to be occupied by thin-walled vesicular cells. The pileus-surface consists of prostrate hyphae 5–12μ wide, with small clamp connections. The fructifications arose from soil beneath a log so that the mycelium may have been attached to rotting wood.

Collybia cubensis (Berk. & Curt.) Dennis in Trans. Brit. mycol. Soc. 34: 454 (1951).

800 m., on dead branches, Guatopo forest, Edo. Miranda, 22.6. 1958, *Dennis*

1093; 900 m., at base of dead stems and on dead basal sheaths of *Cyperus articulatus*, Botanic Garden, Caracas, Dto. Federal, 30.6.1958, *Dennis* 1175.

The above name has been retained to facilitate comparison with the Trinidad list but the affinities of the species are rather with *Marasmiellus*.

Collybia dryophila (Bull. ex Fr.) Kummer, Fuhrer Pilzkunde: 115 (1871).

About 1000 m., around the base of a wooden plant-stand in a garden, Los Chorros, Caracas, Edo. Miranda, 21.6.1958, *Dennis* 1089; in small clusters under *Arundo donax* in the Botanic Garden, Caracas, 30.6.1958, *Dennis* 1126.

Collybia johnstonii (Murr.) Dennis in Trans. Brit. mycol. Soc. 34: 437 (1951) 800 m., Guatopo forest, Edo. Miranda, 22.6. 1958, *Dennis* 1189

Fig. 5 (on left). *Collybia meridana*. Spores × 660.

Fig. 6 (above). *Collybia mucubajiensis*. Basidium and spores × 660.

Collybia meridana *Dennis*, sp. nov.

Pileus convexus, 2·5 cm. latus, castaneus, glaber, udus, margine striatus; caro concolor; lamellae confertae, 5 mm. latae, albae, postice sinuato-adnatae; stipes cavus, glaber, basi fusiformis radicatus, sursum pileo concolor, deorsum pallidus, 7 cm. longus 4–7 mm. crassus; sporae oblongae, apiculatae, vix amyloideae, 7–9 × 3–3·5μ. Fig. 5.

Hab. 3440 m., in silvis frondosis, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1738 (typus).

The pileus-surface is formed of prostrate subhyaline hyphae 3μ wide, overlying a subcuticular region of compact, broader, brown hyphae. There is no gelatinous tissue in the trama and no cystidia. The species differs from *C. fuegiana* Sing. in its coloured flesh.

Collybia mucubajiensis *Dennis*, sp. nov.

Pileus submembranaceus, e convexo-expansus, 13 mm. latus, glaber,

cinnamomeus ('Cinnamon Buff' Ridgway), margine striatus; caro concolor, inodora; lamellae confertae 2·5 mm. latae, luride alutaceae, postice sinuato adnatae; stipes aequalis, 4 cm. longus, 1 mm. crassus, fistulosus, glaber, deorsum badio-rufus ('Vinaceous Fawn' Ridgway), sursum pallide fuscidulus; sporae ellipticae, apiculatae, vix amyloideae, 7–9 × 2·5–3·5μ. Fig. 6.

Hab. 3550 m., ad terram, Paramo de Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 23.7.1958, *Dennis* 1712 (typus).

The pileus-trama consists of interwoven hyaline hyphae 4–5μ wide and a single layer of similar hyphae with light brown walls covers the pileus. There are no cystidia and the gill-edge is fertile. Bresadola's Tab. 497/2, entitled *Marasmius calopus*, gives a good idea of the macroscopic appearance, but his fungus has prominent cystidia.

Collybia proletaria *Dennis*, sp. nov.

Pileus submembranaceus, convexus, 1·4 cm. latus, badius ('Wood Brown' Ridgway), sericeo-fibrillosus; caro alba, odore vix speciali, ? subfarinacea; lamellae subdistantes, postice adnexae, 2 mm. latae, vinaceo-cinnamomeae, acie pallidiores; stipes aequalis, solidus, 2·5 cm. longus, 1·5 mm. crassus, argillaceus, velutino-villosus; sporae ellipticae, apiculatae, vix amyloideae, 7·5–8 × 4·5μ. Fig. 7.

Hab. ad terram in hortis, Caracas, Dto. Federal, 19.6.1958, *Dennis* 1069 (typus).

The hairs of the stipe are cylindrical, pointed, thick-walled, hyaline, up to 100 × 4μ but the gill-edge is fertile and there are no cystidia.

Fig. 7. *Collybia proletaria*. Spore × 660.

Fig. 8. *Collybia laccata*. Spores × 660.

Collybia laccata *Dennis*, sp. nov.

Pileus submembranaceus, 2·5 cm. latus, lateritius ('Orange Cinnamon' Ridgway), e convexo-expanso depressus, glaber, margine saepe undulato-lobatus; caro pallide carneo-rufescens; lamellae carneo-rufescens ('Vinaceous Cinnamon' Ridgway), subconfertae, 4 mm. latae, postice sinuato-adnatae; stipes aequalis, 2·5 cm. longus, 3 mm. crassus, glaber, farctus, pileo concolor; sporae ellipticae, apiculatae, vix amyloideae, 6·5–9·5 × 2·5–3·5μ, basidia 25 × 5μ. Fig. 8.

Hab. 3560 m., ad terram, Paramo de Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 1.8.1958, *Dennis* 1782 (typus).

The general aspect of the fungus is that of *Laccaria laccata*. The gill-trama is composed of subparallel hyphae 4μ wide, thin-walled, yellow in Melzer's

reagent; the pileus-trama of similar but loosely woven hyphae with clamp connections, which become tightly woven at the pileus-surface. There are no cystidia and the spore-print is white.

Collybia pseudomphalodes *Dennis*, sp. nov.

Caespitosa; pileus membranaceus, e convexo-explanatus interdum umbonatus, glaber, cremeus, centro rufescente, margine striatus; caro alba; lamellae confertissimae, albae, strictae, 1·5 mm. latae, postice sinuato-adnatae, acie fimbriatae; stipes aequalis, 3–4 cm. longus, 2 mm. crassus, fistulosus, sursum albidus, deorsum rufescens vel fuscescens, villo albo denso obtectus; cheilocystidia cylindracea, obtusa, 40 × 3μ, basidia 16 × 3μ; sporae ellipticae, apiculatae, vix amyloideae, 5–6 × 3·5μ. Fig. 9.

Hab. 800 m., ad frustula lignea in silvis, Guatopo, Edo. Miranda, 25.6.1958, *Dennis* 1108 (typus).

The pileus-surface consists of prostrate hyphae and the stipe is covered with thin-walled, hyaline, matted hyphae, 2·5μ wide, with clamp connections. Similar hyphae protrude from the gill-edge to form the cheilocystidia. Those of the gill-trama are subparallel, 8–9μ wide and not pseudoamyloid.

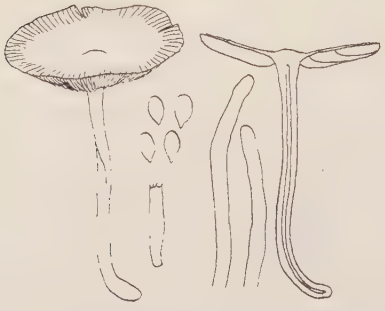


Fig. 9 (on left). *Collybia pseudomphalodes.* Basidium spores and cheilocystidia × 660.

Fig. 10 (above). *Anthracophyllum andinum.* Spores × 660.

This superficially resembles *C. omphalodes* (Berk.) Dennis but is at once distinguished by the absence of pleurocystidia. It is perhaps closer to *C. hirtella* (Berk. & Br.) Dennis, from which it differs in habit and slightly in spore-shape. *C. pseudoboryana* Dennis differs in its completely white stipe.

Collybia semi-usta (Berk. & Curt.) Dennis in Trans. Brit. mycol. Soc. 34: 450 (1951).

800 m., in swarms on dead branches, Guatopo, Edo. Miranda, 22.6.1958, *Dennis* 1092.

Anthracophyllum andinum *Dennis*, sp. nov.

Pileus reniformis, tenuis, 2–3 cm. latus, pallidus, pruinosus, margine sulcatus; lamellae distantes, reticulato-connexae, albae, postice adnatae; stipes brevis, aequalis, albus, 2 mm. crassus, excentricus vel lateralis, farctus; basidia clavata, c. 50 × 10–11μ; sporae subglobosae, apiculatae, 16–18 × 12–14μ, 1-guttulatae. Totus fungus exsiccando nigrescit. Fig. 10.

Hab. 3440 m., ad truncos ramosque arborum frondosarum, Lagune Negra, Sierra de Santo Domingo, Edo. Mérida, 1.8.1958, *Dennis* 1758A (typus).

Omphalina near *O. brownii* (Berk. & Br.) P. D. Orton in Trans. Brit. mycol. Soc. 43, suppl.: 127 (1960).

Cantharellus brownii Berk. & Br. in Ann. Mag. Nat. Hist., Ser. 2, 2: 262 (1848).

Solitary; pileus about 5 mm. diameter, convex, umbilicate, light reddish brown, dry, lamellae crowded, narrow, often forked towards the margin, concolorous; stipe slender, equal, concolorous; no cystidia, spores subglobose to broadly elliptical, 6–9 × 4·5–6μ, non-amyloid; pileus-surface formed of prostrate hyphae, 7–10μ wide, with thin light-brown, non-encrusted walls and clamp connections. Such few basidia as retain sterigmata are 2-spored.

About 2500 m., in short moss on an exposed bank, summit ridge of La Silla, Dto. Federal, 4.7.1958, *Dennis* 1174.

In Singer's key (1957) this keys to *O. rustica* (Fr.) Quél., but it is not the *O. rustica* of Kühner & Romagnesi, which has no clamps, nor *O. obscurata* (Kühner) Lange, which has encrusted surface hyphae.

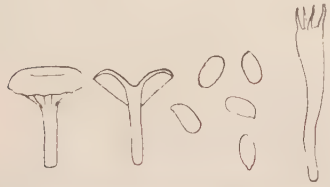


Fig. 11. *Omphalina ericetorum*. Basidium and spores × 660.

Fig. 12. *Omphalina luteovitellina*. Spores × 660.

Omphalina ericetorum (Fr.) M. Lange in Med. om Grønland 147(11): 25 (1955).

Pileus 1 cm. diameter, convex, deeply umbilicate, Cream Colour, smooth, dry; lamellae distant, 2 mm. broad, decurrent, a little paler than the pileus; stipe about 8 × 1·5 mm., whitish, smooth, solid; flesh thin, white; spores elliptical, 6–7 × 3–4μ, nonamyloid; basidia 4-spored, 25–32 × 8μ, no cystidia. Fig. 11.

3560 m., Paramo de Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 22.7.1958, *Dennis* 1702.

Omphalina luteo-vitellina (Pilat & Nannf.) M. Lange in Med. om Grønland 147(2): 63 (1957).

Pileus 14 mm. diameter, convex, becoming slightly depressed at the disc, Lemon Chrome, smooth, dry, not striate; lamellae subdistant, 2 mm. broad, of two lengths, much interveined, a little paler than the pileus, slightly decurrent; stipe about 10 × 2 mm., equal or enlarged upwards, concolorous or paler, smooth, hollow; flesh thin, yellow. Spores elliptic-cylindric, 6–8 × 2·5–3·5μ, nonamyloid; basidia mostly 4-spored, no cystidia; pileus-surface formed of broad, prostrate, hyaline hyphae. Fig. 12.

About 3560 m., in swarms amongst moss and lichens on vertical rock face near waterfall at head of valley south of Laguna Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 23.7.1958, *Dennis & Buza* 1710. Just the kind of habitat it favours in the Scotch Highlands and in Norway.

Omphalina obatra (*Favre*) *Dennis*, comb. nov.

Omphalia obatra Favre in Res. Rech. Scient. Parc. Nat. Suisse, N.S., 5 (33): 199 (1955).

Pileus 7 mm., convex with a broad shallow umbilicus, Fuscous, smooth, dry, margin slightly sulcate and crenate; lamellae subdistant, 1 mm. broad, Drab-grey, decurrent; stipe about 8 × 1 mm., cylindrical, concolorous with the pileus, smooth, solid; flesh thin, whitish. Spores broadly elliptical, apiculate, 6–8 × 4–5·5μ, nonamyloid; basidia 22–35 × 6μ, 4-spored; no cystidia; gill-trama formed of pale brownish hyphae, those of the pileus-trama hyaline, 4–5μ wide and clamped, pileus-surface of prostrate hyphae up to 10μ wide, with thin dark-brown walls, perhaps slightly encrusted. Fig. 13.

3560 m., on bare soil among *Cladonia* squamules, Paramo de Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 22.7.1958, *Dennis & Buza* 1701.

Fig. 13. *Omphalina obatra*. Basidium and spores × 660.

Fig. 14. *Omphalina oblongispora*. Basidium and spores × 660.

Omphalina oblongispora *Dennis*, sp. nov.

Pileus submembranaceus, 10–14 mm. latus, e convexo expansus, albus, glaber, margine striatus; lamellae distantes, albae, decurrentes, angustae, tenues; stipes 10 mm. longus, 1·5 mm. crassus, aequalis, flexuosus, albus, glaber; sporae hyalinae, subcylindraceae, apici attenuatae, rectae vel curvatae, apiculatae, vix amyloideae, 8–10 (–11) × 2·5–3μ; basidia tetraspora, 20–30 × 5–6μ. Fig. 14.

Hab. 3440 m., locis humidis muscosis in silvis, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 1765 (typus).

Pileus-surface composed of subparallel, thin-walled, hyaline, prostrate hyphae, trama yellow in Melzer's reagent, no cystidia.

Omphalina pseudofibula *Dennis*, sp. nov.

Pileus membranaceus, 5 mm. latus, convexus, umbilicatus, luteus ('Cadmium Yellow Ridgway), glaber; caro concolor; lamellae subconfertae, arcuato-decurrentes, 1·5 mm. latae, concolores; stipes aequalis, 14 mm. longus, 1 mm. crassus, farctus, pileo concolor, glaber; sporae ellipticae, vix amyloideae, 7–8 × 5–6·5μ; basidia clavata, tetraspora. Fig. 15.

Hab. 3550 m. ad terram nudam inter muscos humiliores, Paramo de Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 24.7.1958, *Dennis & Buza* 1703 (typus).

Omphalina near *O. rustica sensu* Kühner & Romagnesi.

Pileus up to 2 cm. diameter, convex, depressed at the disc, between Drab and Hair Brown, very finely tomentose and not shining like *O. ericetorum*, dry, margin sulcate-striate; lamellae distant, horizontal, adnate, up to 3 mm. broad, rather thick and sometimes forked but not at all interveined, Light Drab; stipe cylindrical, about 15 × 2 mm., Light Drab to Drab, smooth, solid; flesh thin, concolorous. Spores elliptic-cylindric to ovoid, 8–10 × 4·5–5·5μ, nonamyloid; basidia 4-spored, 3-spored or 2-spored, 40 × 6–9μ; no cystidia; pileus-surface formed of thin-walled light grey-brown hyphae 5–7μ wide, with clamp connections. Fig. 16.

3600 m., in wet moss on peaty soil, first corrie of the Sierra de Santo Domingo, south of Laguna Mucubaji, Edo. Mérida, 24.7.1958, *Dennis & Buza* 1725.

Fig. 15. *Omphalina pseudofibula*. Spores × 660.

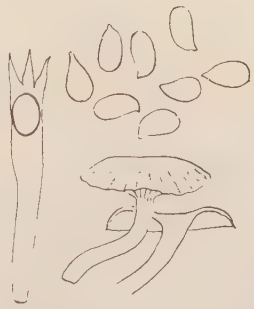


Fig. 16. *Omphalina* near *O. rustica*. Basidium and spores × 660.

? *Omphalina lenta* Murr. in N. Amer. Fl. 9: 349 (1916).

Pileus 5 mm. diameter, infundibuliform, margin slightly incurved, Cream Buff, browner in the umbilicus, margin faintly striate, smooth, dry; flesh thin, white; lamellae deeply decurrent, of 3 lengths, Cream coloured, very narrow; Stipe equal, 15 × 1 mm., Clay colour, smooth, flesh white and fibrous, arising from a small patch of white mycelium. Pileus-surface formed of prostrate, nonencrusted hyphae 5μ wide, stipe of similar parallel hyphae 3μ wide with clamp connections; gill-edge fertile, no cystidia, basidia 4-spored; spores broadly elliptical, 3·5–4·5 × 2–3μ, non-amyloid, print white. Fig. 17, p. 78.

900 m., on dead fallen sticks and debris, Botanic Garden, Caracas, Dto. Federal, 19.6.1958, *Dennis* 1073.

The Venezuelan fungus is presumably a *Gerronema*. Murrill's description, though it agrees with the above as far as it goes, is inadequate for precise identification. I therefore refrain at present either from proposing a transfer of his species to *Gerronema* or describing my 1073 as a different species. It

seems to differ in colour, stature and spore-size from *Clitocybe jalapensis* (Murr.) Sing.

Gerronema tenuis *Dennis*, sp. nov.

Pileus membranaceus, 6 mm. latus, e convexo umbilicatus, striatus, aureo-vitellinus, glaber; lamellae distantes, angustae, tenues, decurrentes, aureo-vitellinae; stipes aequalis, 11 mm. longus, 0·5 mm. crassus, pileo concolor, pruinosus; sporae ovoideae, vix amyloideae, 6–8 × 5–6μ, 1-guttulatae. Fig. 18.

Hab. 900 m., ad frustula lignea, Caracas, Dto. Federal, 3.7.1958, *Dennis* 1132 (typus).

Pileus-surface composed of subparallel hyphae about 4μ wide, trama yellow in Melzer's reagent, with no gelatinised tissue; spore print white, basidia 4-spored, 40 × 7·5μ, with oily contents; no well defined cystidia though sparse cylindrical hairs 10–15 × 2 protrude from the gill-edge.

Fig. 17. ? *Omphalina lenta*. Spores × 660.

Fig. 18. *Gerronema tenuis*. Basidium and spores × 660.

Callistosporium luteo-olivaceum (Berk. & Curt.) Sing. in Lilloa 22: 232 (1951).

Solitary; pileus convex with a shallow broad umbilicus, 2 cm. diameter, between Yellow Ochre and Buckthorn Brown, smooth, dry, margin somewhat incurved, not striate; flesh thin, Straw Yellow; lamellae crowded, narrow, decurrent, interveined, occasionally forked and anastomosing, concolorous; stipe equal, flexuous, 40 × 4 mm., slightly fibrillose-floccose, concolorous except for a white base, stuffed. Pileus surface a layer of prostrate hyphae, 7–9μ wide, their walls heavily encrusted with yellowish matter, becoming reddish purple in ammonia, bearing suberect, thinwalled, somewhat encrusted, unicellular hairs about 50 × 6–7μ; basidia clavate, 25 × 4–5μ, 4-spored, some filled with yellow granular matter which turns reddish purple in ammonia; spores elliptical, 4–5 × 2·5–3μ, with a conspicuous guttule and sometimes a yellow inclusion, non-amyloid; cystidia absent. Fig. 19.

1300 mm., on bare soil in forest, Los Guayabitos, Edo. Miranda, 8.6.1958, *Dennis & Foldats* 1013.

Dermoloma inconspicuum *Dennis*, sp. nov.

Pileus 1·5 cm. latus, convexus, subumbonatus, glaber, ferrugineo-umbrinus ('Russet' Ridgway), margine rivulosus; caro alba, in stipite

lateritia; lamellae confertissimae, 2 mm. latae, subochraceae, postice emarginato uncinatae; stipes 3 cm. longus, 2 mm. crassus, subaequalis, lateritius, albo-fibrillosus; sporae ellipticae, 1-guttulatae, vix amyloideae, 3–5 × 2–2·5μ. Fig. 21, p. 80.

Hab. ad terram in hortis, Caracas, Dto. Federal, 3.7.1958, *Dennis* 1131 (typus).

The pileus-surface is covered by a hymeniform layer of clavate cells, about 15–25 × 10–12μ, with thin red-brown walls, perhaps very slightly encrusted with pigment. The gill-edge is fertile, with 4-spored basidia, and there are no cystidia. The spore-print is white.

Tricholoma microsporum (Ellis) Sacc., Syll. Fung. 5: 111 (1887).

1200 m., on soil in garden, Cortada del Guayabo, Edo. Miranda, 9.7.1958, *Dennis* 1155.

FIG. 19. *Callistosporium luteo-olivaceum*. Basidium and spores × 660.

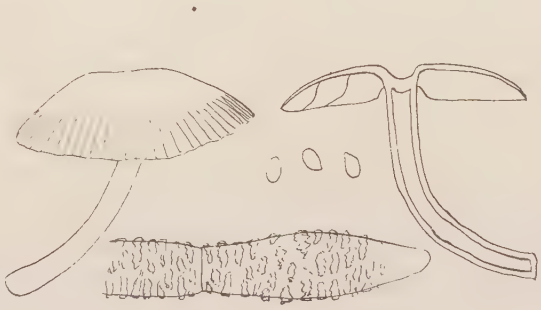


FIG. 20. *Tricholoma umbilicatum*. Spores and hypha from pileus-surface × 660.

Tricholoma pachymeres (Berk. & Br.) Sacc., Syll. Fung. 5: 120 (1887) *sensu* Baker & Dale.

800 m., in roadside grass, Guatopo, Edo. Miranda, 22.6.1958, *Dennis & Aristeguieta* 1095.

Tricholoma umbilicatum *Dennis*, sp. nov.

Pileus membranaceus, 3 cm. latus, e convexo-explanatus, umbilicatus, vinaceo-brunneus, ('Army Brown'–'Vinaceous Brown' Ridgway), glaber, margine striatus et argillaceus; caro concolor; lamellae confertae, 4 mm. latae, postice sinuato-adnatae, vinaceo-brunneae, aetate carneolae, acie pallidiores; stipes aequalis, 3 cm. longus, 3 mm. crassus, concolor, fistulosus, sursum pruinosus; sporae oblongae, vix amyloideae, 4–5 × 2·5μ. Fig. 20.

800 m., ad terram in silvis frondosis, Guatopo, Edo. Miranda, 27.6.1958, *Dennis* 1111A (typus); 26.6.1958, *Dennis* 1111.

The pileus-surface is formed of matted prostrate hyphae 6–12μ wide, their thin walls encrusted with brownish matter and their terminal cells some-

what inflated. The trama stains yellow in Melzer's reagent. There are no cystidia and no clamp connections.

Tricholoma venezuelanum *Dennis*, sp. nov.

Pileus carnosus, convexus, 2·8 cm. latus, glaber, griseo-murinus, margine primitus involuto; caro alba, odore farinacea, sapore subamara; lamellae subconfertae, albae, 2·5 mm. latae, postice emarginato-uncinatae; stipes subaequalis, 17 mm. longus, 5 mm. crassus, albus, fibrillosus, farctus; sporae cylindricae, vix amyloideae, 4–6·5 × 2·5–3·5μ, basidia tetraspora, 25 × 6μ. Fig. 22.

Hab. ad terram in hortis, Caracas, Dto. Federal, 11.7.1958, *Dennis* 1613 (typus).

Pileus-surface formed of closely woven hyphae, 2–3μ wide, with grey-brown walls; gill-edge fertile, no cystidia.

Fig. 21. *Dermoloma inconspicuum*. Spores and pilocystidia × 660.

Fig. 22. *Tricholoma venezuelanum*. Basidium and spores × 660.

Lentinellus vulpinus (Sow. ex Fr.) Kühner & Maire in Bull. Soc. mycol. France 50: 16 (1934).

3440 m., on dead trunk, Laguna Negra, 27.7.1958, *Dennis & Buza* 2532; 3550 m., imbricate on dead *Espeletia*, Laguna Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 23.7.1958, *Dennis & Buza* 1718.

Lentinellus omphalodes (Fr.) Karst., Hattsvamp 1: 248 (1879) forma.

Pileus 4 cm. diameter, convex, testaceous, smooth and shining but dry, margin closely striate; lamellae rather close, of 2 or more lengths, 3 mm. broad, Salmon colour, decurrent; stipe very short, whitish hollow; flesh white under the red cuticle, flabby. Spores elliptic-cylindric, sometimes a little reniform, amyloid, 6–7·5 × 3–3·5μ.

About 3650 m., gregarious on a dead branch in forest a little below Laguna de los Patos, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 1762.

Resupinatus rhacodium (Berk. & Curt.) Sing. in Lilloa 22: 253 (1951).

1300 m., gregarious on a log, Los Guayabitos, Edo. Miranda, 8.6.1958, *Dennis* 1009.

Resupinatus silvanus (Sacc.) Sing. in Lilloa 22: 253 (1951).

2000 m., on dead branch, El Avila, Dto. Federal, 13.6.1958, *Dennis* 1368A.

Hohenbuehelia geogenia (DC. ex Fr.) Sing. in Lilloa 22: 255 (1951).

900 m., on bare soil of a bank, Botanic Garden, Caracas, Dto. Federal, 20.6.1958, *Dennis* 1084.

Hohenbuehelia petaloïdes (Bull. ex Fr.) Schulzer in Verh. Zool.-bot. Ges. Wien 16, Abh.: 45 (1866) forma *americana* Pilat, *op cit.* 90 (1935).

800 m., on logs, Guatopo, Edo. Miranda, 25.6.1958, *Dennis* 1109.

Dictyopanus pusillus (Lév.) Sing. in Lloydia 8: 224 (1945).

About 2200 m., on stump in forest, La Mucuy, near Tabay, Sierra Nevada, Edo. Mérida, 4.8.1958, *Dennis* 1789.

Schizophyllum commune Fr., Syst. Myc. 1: 330 (1821).

Puerto Caripito, Delta del Orinoco, June 1943, *F. Cardona* 591 in Herb. Caracas.

Very common and reported by Patouillard & Gaillard from Palissades d'Atures, by Patouillard & Heim from Guarico and Apure, by Linder (as *S. radiatum* (Sw.) Fr.) from Puerto Zamura, 1887, by Sydow from Caguita and by Chardon & Toro from the states of Aragua and Miranda. *S. brevilamellatum* Linder, described from Venezuela, is only a state of this cosmopolitan species.

Schizophyllum fasciatum Pat. in Journ. de Bot. 1: 170 (1887).

? Colonia Tovar, *Fendler* 50, det. W. B. Cooke.

Recorded by Patouillard & Gaillard from Palissades d'Atures and by Wolf from the states of Sucre and Aragua. According to Linder *S. mexicanum* Pat. is a synonym.

Schizophyllum umbrinum Berk. in Hook., Journ. Bot. 3: 15 (1851).

About 900 m., Rio Chacaito, Caracas, 18.11.1949, *Dennis* 480.

Pleurotus catephes (Berk.) Sacc., Syll. Fung. 5: 365 (1887).

2400 m., on *Hedychium* stems, Rancho Grande, Edo. Aragua, 19.11.1949, *Dennis* 342.

Pleurotus conchatus (Fr.) Pilat, *op. cit.* 159 (1935).

1300 m., on dead stick in forest, Los Guayabitos, Edo. Miranda, 20.6.1958, *Dennis* 1085.

Pleurotus eugrammus (Mont.) Dennis in Kew Bull. 8: 35 (1953).

50 m., imbricate on logs, Chichiriviche, Dto. Federal, 6.7.1958, *Dennis & Aristeguieta* 1203; ? Colonia Tovar, *Fendler* 54.

Recorded by Patouillard & Gaillard, as *Panus wrightii* Berk. & Curt., from Caracas and by Patouillard & Heim from Guasdualito and Sarare.

Pleurotus opuntiae (Dur. & Lév.) Sacc., Syll. Fung. 5: 363 (1887).

3460 m., on dead *Espeletia schultzii*, Laguna de Canoa, Sierra de Santo

Domingo, Edo. Mérida, 30.7.1958, *Dennis & Buza* 1753; also old specimens on the same host at Laguna Mucubaji.

Differs from *P. ostreatus* in the white spore-print and rather shorter spores. 7·5–9 × 3·5—nearly 4μ. Fig. 23.

Pleurotus panelloïdes *Dennis*, sp. nov.

Pileus 2·5 cm. latus, subcoriaceous, reniformis, tenuis, pallide ochraceus, ('Maize Yellow' Ridgway), glaber, subsessilis; caro alba, haud gelatinosa; lamellae confertissimae, postice attenuato-decurrentes, tenues, concolores; stipes albus, tomentosus, tuberculiformis; sporae ellipticae, 2·5 × 1·5–1·75μ, vix amyloideae. Fig. 24.

Hab. 200 m., ad truncos excisos, Chichiriviche, Dto. Federal, 6.7.1958, *Dennis* 1151 (typus).

This has the air of a *Panellus* but nonamyloid spores; the print is white and there are no cystidia and no gelatinised tissues.

Fig. 23 (on left). *Pleurotus opuntiae*. Spores × 660.

Fig. 24 (above). *Pleurotus panelloïdes*. Spores × 660.

Pleurotus subhaedinus (Murr.) Murr. in Mycologia 8: 217 (1916).

900 m., on bark, Rio Chacaito, Caracas, 18.11.1949, *Dennis* 371.

Cheimonophyllum candidissimum (Berk. & Curt.) Sing. in Sydowia 9: 417 (1955).

3440 m., on dead wood, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 2534.

Lentinus crinitus (L. ex Fr.) Fr., Syst. Orb. Veg.: 77 (1825).

800 m., on logs in forest, Guatopo, Edo. Miranda, 22–24.6.1958, *Dennis* 1187 & 1187A; 900 m., common on fallen branches, Botanic Garden, Caracas, 20.6.1958, *Dennis* 1083; 1300 m., on logs in forest, Los Guayabitos, Edo. Miranda, 8.6.1958, *Dennis* 1337; 2000 m., on logs in forest of Sierra Nevada, La Mucuy, Edo. Mérida, 6.8.1958, *Dennis* 2505.

The spores measure 5–6 × 2μ. Recorded by Chardon & Toro from the state of Tachira and probably this as *L. villosus* Klotzsch by Patouillard &

Gaillard from San Bartolo and by Patouillard & Heim from Guasdualito and S. Fernando de Apure.

Lentinus detonsus Fr. in Acta Reg. Soc. Sci. Upsal., Ser. 3, 1: 38 (1851).

800 m., caespitose on logs and trunks, Guatopo, Edo. Miranda, 22.6.1958, *Dennis* 1097.

Recorded by Patouillard & Heim as *L. cubensis* Berk. & Curt. from S. Fernando de Apure.

Lentinus strigosus (Schwein.) Fr., Syst. Orb. Veg.: 77 (1825).

800 m., on logs in forest, Guatopo, Edo. Miranda, 25.6.1958, *Dennis* 1112; 2000 m., on log in forest of Sierra Nevada, La Mucuy, Edo. Mérida, 6.8. 1958, *Dennis* 2504.

Recorded by Patouillard & Heim as *Panus rudis* Fr. from Guasdualito, S. Fernando de Apure and R. Surare and by Wolf from Carupano, Sucre.

Lentinus velutinus Fr. in Linnaea 5: 510 (1830).

800 m., caespitose on logs in forest, Guatopo, Edo. Miranda, 22.6.1958, *Dennis* 1278.

Spores 4–5·5 × 2–2·25μ. Recorded by Patouillard & Gaillard from Caracas.

Oudemansiella canarii (Jungh.) von Höhnel in Sitz. Kaiserl. Akad. Wiss. Wien. Math.-naturw. Kl. 118: 276 (1909).

About 2500 m., forest of the Sierra Nevada, La Mucuy, Edo. Mérida, 6.8.1958, *Dennis* 1786.

It was presumably this that Patouillard & Gaillard reported from Puerto Zamuro as *O. platensis* Speg. var. *orinocensis* Pat. & Gaill. and Patouillard & Heim as *Mucidula cheimonophylla* (Berk. & Curt.) Pat. from unspecified localities in the states of Guarico and Apure.

Hemimycena anomala *Dennis*, sp. nov.

Pileus convexus, reniformis, 5 mm. latus, pallide fusco-cinereus, striatus, glaber; lamellae confertae, albae, postice adnatae; stipes lateralis, aequalis, 5 mm. longus, 1 mm. crassus, albus, glaber; sporae ellipticae, vix amyloideae, 5–6 × 3μ; basidia clavata, tetraspora, 20 × 5μ. Fig. 25, p. 84.

Hab. 1900 m., ad ligna putrida, in silvis, El Junquito, 1.6.1958, *Dennis* 1039 (typus).

Pileus-surface composed of somewhat pyriform cells 12μ diameter, overlying a trama of parallel hyphae stained somewhat red-brown by Melzer's reagent, cystidia not observed.

Hemimycena fibula (Bull. ex Fr.) Sing. in Ann. mycol. 41: 123 (1943).

Pileus 13 mm. diameter, hemispherical with a shallow umbilicus, Ochraceous Tawney, smooth, dry, margin not striate; flesh thin, concolorous; lamellae rather crowded, 1·5 mm. broad, white, arched and deeply decurrent; stipe cylindrical, about 25 mm. long and 1 mm. thick, concolorous, sparsely downy, hollow. Spores elliptical, nonamyloid, hyaline,

4·5–5·25 × 2·5–3μ, print white; basidia 4-spored, 4·5μ wide; cheilocystidia narrowly ventricose, thin-walled, about 40 × 5–6μ; pleurocystidia and caulocystidia similar; tramal hyphae yellow in Melzer's reagent, pileus-surface of parallel, prostrate, thinwalled hyphae. Fig. 26.

3550 m., in deep moss and *Deyeuxia* sp. on the paramo, Laguna Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 23.7.1958, *Dennis & Buza* 1715.

The fructifications are rather large for the species and the spores a little shorter and broader than in European material.

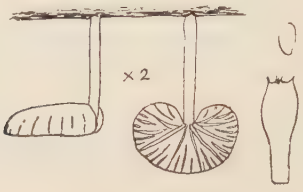


Fig. 25 (above). *Hemimycena anomala*. Basidium and spore × 660.

Fig. 26 (on right). *Hemimycena fibula*. Cystidium and spores × 660.

Hemimycena filicina *Dennis*, sp. nov.

Pileus membranaceus, e hemisphaerico convexus, 5 mm. latus, glaber, nitidus, coccineus ('Scarlet Red'–'Carmine' Ridgway); caro concolor; lamellae paucae, distantes, vix 1 mm. latae, postice adnato-decurrentes, pileo concolores; stipes aequalis, brevis, ad 1 mm. crassus, glaber, farctus, pileo concolor; sporae ellipticae, vix amyloideae, 7·5–9 × 5–6μ; basidia tetraspora, 25 × 10μ; cheilocystidia ventricosa. Fig. 27.

Hab. 800 m., ad caudices filicum arborescentium in silvis, Guatopo, Edo. Miranda, 22.6.1958, *Dennis* 1090 (typus).

Pileus-surface formed of thin-walled hyphae 35μ wide, with pink sap, trama not stained red-brown by Melzer's reagent.

Hemimycena gigaspora *Dennis*, sp. nov.

Pileus membranaceus, e campanulato expanso-umbonatus, fuscus ('Bister' Ridgway), ad mediam lineater plicatus, 3 cm. latus; caro fuliginea, coriacea, in stipite alba; lamellae distantes, albae, in fundo cinereae, postice adnatae, 5–6 mm. latae, venoso-conjunctae; stipes aequalis, 3·5 cm. longus, 2 mm. crassus, glaber, fistulosus, albus; sporae subglobosae, apiculatae, vix amyloideae, 10–13 × 9–11·5μ; basidia clavata, tetraspora, 34–46 × 15–16μ. Fig. 28.

Hab. 3440 m., ad ramos in silvis, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 1.8.1958, *Dennis* 1771.

Pileus-surface composed of thin-walled prostrate cells, 40–45 × 27–30μ, filled with grey-brown sap; cystidia absent.

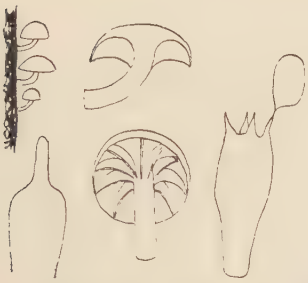


FIG. 27. *Hemimycena filicina*. Carpophores natural size and × 4, cheilocystidium, basidium and spore × 660.

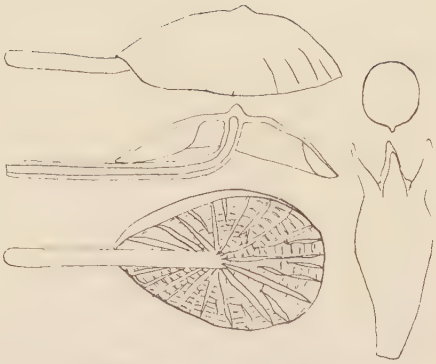


FIG. 28. *Hemimycena gigaspora*. Basidium and spore × 660.

Hemimycena junquitoënsis *Dennis*, sp. nov.

Pileus membranaceus, convexus, 1 cm. latus, fusco-cinereus, striatus, glaber; lamellae subdistantes, postice adnatae, pallidae; stipes brevis, excentricus, albopruinosus; sporae ellipticae, vix amyloideae, 7–8 × 4·5–5μ, 1-guttulatae. Fig. 29.

Hab. ad ramos in silvis, 1900 m., El Junquito, Dto. Federal, 10.6.1958, *Dennis* 1038 (typus).

Pileus-surface composed of broad, parallel, thin-walled hyphae with clamp connections, hairs of the stipe short, hyaline, obtuse, thin-walled, trama yellow in Melzer's reagent, pleurocystidia absent, gill-edge occupied by clavate cells 12 × 7μ with usually four stout processes.

FIG. 29. *Hemimycena junquitoënsis*. Cheilocystidium and spore × 660.

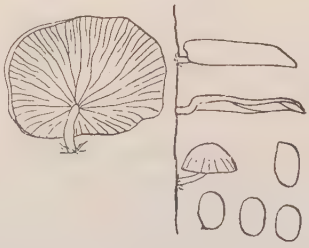


FIG. 30 (on right). *Hemimycena primulina*. Spores × 660.

Hemimycena primulina *Dennis*, sp. nov.

Pileus membranaceus, e convexo explanatus, 2 cm. latus, luteus ('Primuline Yellow' Ridgway), glaber, flexilis, translucidus, margine striato-sulcato; caro concolor; lamellae subconfertae, 2 mm. latae, postice adnatae, concolores; stipes aequalis, brevis, centralis vel excentricus, 1 mm. crassus, pileo concolor, glaber, basi albo-strigosus; sporae ellipticae, vix amyloideae, 7·5–9·5 × 5–5·5μ. Fig. 30.

Hab. 2000 m., ad truncos in silvis, El Avila, Dto. Federal, 17.6.1958, *Dennis* 1061 (typus).

There are no cystidia and the trama remains yellow in Melzer's reagent.

Marasmiellus luteus (Dennis) Sing. differs in its small spores, 5 × 3μ.

Hemimycena roseipallens (*Murr.*) *Dennis*, comb. nov.

Mycena roseipallens Murr. in Mycologia 8: 221 (1916).

Pileus hemisphaerical, up to 13 mm. diameter, closely striate when moist, smooth, dry, scarlet, fading to pink and finally creamy-white from the disc outwards, margin scarlet; lamellae ascending, not crowded, of two lengths, 1–2 mm. wide, pinkish, shading to white at the margin, adnexed; stipe cylindrical, about 15 mm. long and 1 mm. thick, white, smooth, dry, solid; flesh thin and pink in the pileus, pallid at the disc, white in the stipe. Spores subglobose, with a prominent apiculus, 7–8 × 5–5·5μ, nonamyloid; basidia 4-spored, 30 × 8μ, contents oily; cheilocystidia narrowly ventricose about 40 × 8μ, apex rounded, apparently a few similar but smaller pleurocystidia occur; very short, scattered, thin-walled, hyaline, obtuse hairs occur on the pileus-surface. Fig. 31.

340 m., on bark of living *Espeletia humbertii*, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 1757; 1.8.1958, *Dennis* 1757A.

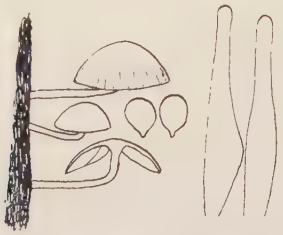


Fig. 31. *Hemimycena rosei-pallens*. Cheilocystidia and spores × 660.

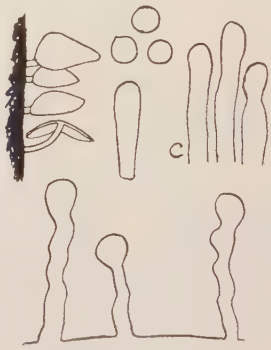


Fig. 32 (on right). *Hemimycena sphaerospora*. Basidium, spores, cheilocystidia (C) and hairs of the pileus × 660.

Hemimycena sphaerospora *Dennis*, sp. nov.

Pileus membranaceus, subcampanulatus, 1 cm. latus, niveus, vix striatus, pruinosus; lamellae subdistantes, albae, postice adnatae, acie fimbriatae; stipes aequalis, brevis, 1 mm. crassus, farctus, albus, pruinosus; sporae globosae, vix amyloideae, 5–5·5μ diam.; cheilocystidia cylindracea, obtusa vel subcapitata, 25 × 4·5μ, hyalina; pilocystidia capitata 30 × 4–6μ. Fig. 32.

Hab. 3440 m., ad corticem arborum, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 1766 (typus).

There are no pleurocystidia but the hairs of the stipe resemble the cheilocystidia.

Hemimycena xanthopoda *Dennis*, sp. nov.

Pileus submembranaceus, convexo-campanulatus, aurantiacus ('Ochraceus Orange'–'Yellow Ochre' Ridgway), glaber; caro lutea; lamellae sub-

confertae, 5 mm. latae, postice adnato-uncinatae, pileo concolores, acie flavae; stipes aequalis, 6 cm. longus, 2 mm. crassus, flavus, glaber; sporae ellipticae, vix amyloideae, 7–8 × 4–4·5μ; basidia tetraspora; cheilocystidia fusoideo-cuspidata, 40–45 × 9–18μ. Fig. 33.

Hab. 2000 m., ad frustula lignea in silvis, El Avila, Dto. Federal, 13.6.1958, *Dennis* 1051; 17.6.1958, *Dennis* 1051A.

Possibly this may prove to be only a state of *Mycena oregonensis* A. H. Sm. for, though there is no coloured gill-edge, some cheilocystidia have granular orange contents when fresh. There seem to be also scanty and inconspicuous fusoid pleurocystidia.

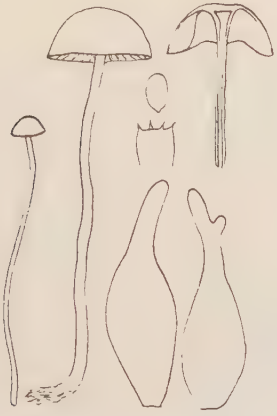


Fig. 33 (above). *Hemimycena xanthopoda*. Cheilocystidia, basidium and spore × 660.

Fig. 34 (on right). *Marasmiellus atrosetosus*. Hair of the pileus, basidium and spores × 660.

Marasmiellus atrosetosus *Dennis*, sp. nov.

Pileus 3 cm. latus, membranaceus, e planatus, umbonatus, albidus, pilis rigidiusculus, nigris, innatis, eleganter obductus; caro pilei albida, stipitis nigra; lamellae distantes, 2–3 mm. latae, isabellinae, postice adnatae, venoso-conjunctae, saepe furcatae; stipes aequalis, 5 cm. longus, 1 mm. crassus, corneus, fistulosus, niger, apice pallidior, albo-fibrillosus; sporae ovato-oblongae, apiculatae, vix amyloideae, 10–14 × 3·5–5·5μ; basidia clavata, tetraspora, 30 × 10μ. Fig. 34.

Hab. ad terram circa trunculos in hortis, Los Palos Grandes, Edo. Miranda, 21.6.1958, *Dennis* 1088 (typus).

The pileus-surface is composed of thin-walled prostrate hyphae 8μ wide, terminating in prostrate, thick-walled, brown setae 100–150 × 4–6μ. Spore-print white, cystidia not observed.

Marasmiellus atroviridis (Berk. & Curt.) Sing. in Sydowia 9: 382 (1956).

800 m., on rotten log in forest, Guatopo, Edo. Miranda, 27.6.1958, *Dennis* 1114.

Marasmiellus guatopoënsis *Dennis*, sp. nov.

Pileus 3·5 cm. latus, e convexo expanso-depressus vel umbilicatus, badio rufus, ('Verona Brown' Ridgway), striato-plicatus, pruinosus, pileus siccus gilvus; caro concolor, inodora et insapora, hygrophana; lamellae subdistantes, crassae, umbrinae, 1·5 cm. latae, postice liberae, rare bifidae; stipes aequalis, fistulosus, 5 cm. longus, 4 mm. crassus, gilvus, albo-pruinosus; sporae oblongae, apiculatae, saepe curvatae, 7–10 × 2·5–3μ, vix amyloideae; cheilocystidia vesiculosa 40 × 12μ. Fig. 35.

Hab. 800 m., ad terram in silvis, Guatopo, Edo. Miranda, 22.6.1958, *Dennis* 1096, 1096A.

Tramal hyphae 4–5μ wide, with clamp connections, pileus-surface formed of similar hyphae slightly encrusted with brown pigment, pleurocystidia absent. This is similar in texture to *M. laschiopus* Sing. but differs in its gill-edge, hollow stipe and terrestrial habit. *Marasmius pruinosifolius* Murr. had smaller spores and cheilocystidia.

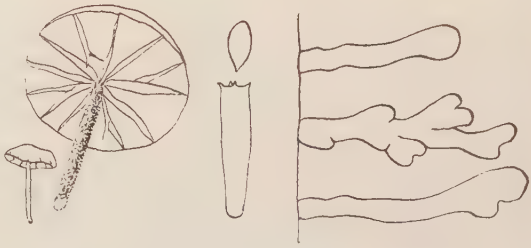


Fig. 35 (on left). *Marasmiellus guatopoënsis*. Cheilocystidia and spores × 660.

Fig. 36 (above). *Marasmiellus opacus*. Carpophore natural size and enlarged, basidium, spore and hairs of the stipe × 660.

Marasmiellus nigripes (Schwein.) Sing. in Pap. Mich. Acad. Sci. 32: 130 (1946).

950 m., on dead twigs and other debris, Botanic Garden, Caracas, 9.6.1958, *Dennis* 1017; 14.7.1958, *Dennis* 1017B.

Marasmiellus opacus (Berk. & Curt.) Sing. in Lilloa 22: 300 (1951).

Pileus convex, 5–8 mm. diameter, cream coloured, drying clay colour, pruinose, slightly radially sulcate; lamellae distant, broad, adnate, sometimes forked, cream; stipe slender, solid, brown, downy with short, hyaline, irregular, often clavate, thin-walled hairs, 3–4μ wide but often enlarged to 5–6μ at the rounded tip, occasionally forked or branched; flesh white,

inodorous, pileus-surface formed of slender diverticulate hyphae, cuticular hyphae not encrusted, trama unstained by iodine, cystidia absent, spores nonamyloid, pip-shaped, 9–10 × 5–5·5μ. Fig. 36.

900 m., attached to dead rootlets on bare soil of open bank in Botanic Garden, Caracas, 3.7.1958, *Dennis* 1134.

Marasmiellus osmophorus *Dennis*, sp. nov.

Pileus membranaceus, convexus, 1·5 cm. latus, luride fulvellus; margine sulcato-striatus; caro concolor, odore forte alliaceo; lamellae subdistantes, postice adnexae, angustae, subalutaceae, acie albae; stipes aequalis, 1 cm. longus, 1 mm. crassus, rufo-brunneus, deorsum niger, glaber; sporae ovatae, apiculatae, vix amyloideae, 6-9 × 2·5–3·5μ; basidia tetraspora, 17 × 5μ. Fig. 37.

Hab. 1300 m., ad ramulos in silvis, Los Guayabitos, Edo. Miranda, 8.6.1958, *Dennis & Foldats* 1008 (typus).

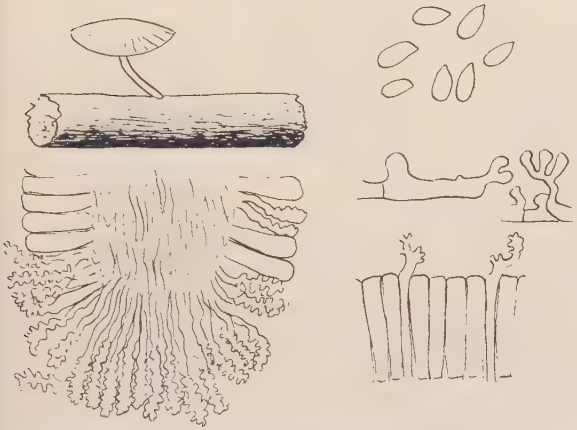


Fig. 37. *Marasmiellus osmophorus*. Section of gill-edge, hymenium, surface hyphae of the pileus and spores × 660.

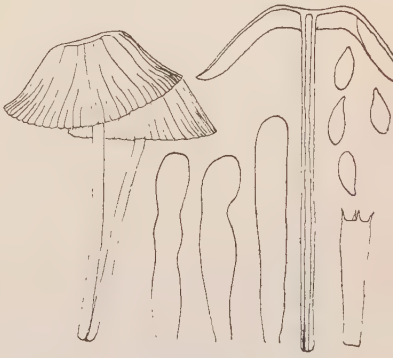


Fig. 38. *Marasmiellus urubambae*. Cheilocystidia, basidium and spores × 660.

Pileus-surface composed of rather loosely woven, thin-walled, light brown hyphae, about 8μ wide, bearing numerous thin-walled, light brown, subglobose cells 12–20μ across, interspersed with short, slender, clavate, hyaline processes up to 10 × 3μ; gill edge formed of similar hyaline hyphae covered with minute nodular outgrowths; similar hyphae about 2μ wide protrude between the basidia. Trama white, not stained red brown by Melzer's reagent; spore-print white.

This seems to be allied to *M. ramorum* Sing., which has broader cheilocystidia, *M. alliodorus* (Bertero) Sing., which has decurrent gills, and *M. subingratus* (Dennis) from which it differs in its smooth stipe and conspicuous sterile gill-edge. *Marasmius ignobilis* Berk. & Br., of Ceylon, as resdescribed by Petch, differs in its shorter light coloured stipe.

Marasmiellus subcoracinus (Berk. & Curt.) Sing. in Sydowia 9: 387 (1956).

950 m., gregarious on dead sticks, Botanic Garden, Caracas, Dto. Federal, 3.7.1958, *Dennis* 1135.

Marasmiellus synodicus (Kunze apud Fr.) Sing. in Sydowia 9: 390 (1956).

950 m., on dead stems, Botanic Garden, Caracas, Dto. Federal, 20.6.1958, *Dennis* 1169; 2000 m., on small dead twigs in cloud-forest, El Avila, Dto. Federal, 13.6.1958, *Dennis* 1173.

Marasmiellus urubambae Sing., sp. nov., ined.

Solitary or in small groups, pileus campanulate, 2–3 cm. wide, disc slightly umbilicate, Sayal Brown, drying Wood Brown to Russet, closely sulcate-striate; flesh thin, smell and taste none; lamellae crowded, of 2 lengths, 2 mm. wide, Wood Brown, adnate, margin whitish; stipe equal, up to 50 mm. long and 1·5 mm. thick, dark grey-brown with whitish downy hairs which disappear on drying, horny, hollow. Pileus-surface formed by thin-walled, light brown hyphae 4–5μ wide, not encrusted; trama not pseudoamyloid; gill-edge fringed with cylindrical to irregularly undulating, obtuse, thin-walled, hyaline hairs, up to 45 × 8μ; no pleurocystidia; spores tear-shaped, nonamyloid, 9–10 × 3·5–4μ. Fig. 38, p. 89.

3550 m., on soil of the Paramo de Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 23.7.1958, *Dennis & Buza* 1713. The species will be formally described elsewhere from Peruvian material.

Singer, in Sydowia 9: 382 (1956) recorded *Marasmiellus calami* (Petch) Sing. from Venezuela but this was an error for 'Colombia'.

Micromphale inodorum *Dennis*, sp. nov.

Pileus submembranaceus, 1 cm. latus, convexus, argillaceus, glaber; lamellae subconfertae, angustae, tenues, postice adnatae, alutaceae; stipes aequalis, brevis, excentricus, cinnamomeus, pruinosus; sporae oblongae, vix amyloideae, 7–8 × 2·5–3μ; cheilocystidia clavata, hyalina, 10–18μ diam. Fig. 39.

Hab. ad ramulos in silvis, 1300 m., Los Guayabitos, Edo. Miranda, 8.6.1958, *Dennis & Foldats* 1014 (typus).

The pileus-surface consists of loosely woven, thin-walled hyphae, 4–8μ wide, without clamps, their walls much encrusted with a brown pigment. Similar very loose hyphae form the upper ¾ of the trama, beneath these is a thin layer of compact, thin-walled, hyaline hyphae, with contents stained deeply in cotton blue, while between this and the hymenium is a zone of more slender hyphae approximately at right-angles to the surface. The entire trama of the pileus is about 125μ thick and, like that of the lamellae, is not pseudoamyloid. Cheilocystidia thin-walled, vesicular-clavate, hyaline, pleurocystidia absent; spore-print pure white, smell none.

Flammulina velutipes (Curt. ex Fr.) Karst. ex Sing. in Lilloa 22: 307 (1951).

3440 m., caespitose on tree in forest, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 1755.

Spores nonamyloid, 6–7 × 3·5–3·75μ.

Pseudohiatula irrorata (Pat.) Sing. in Lilloa 22: 320 (1951).

800 m., in swarms on dead wood, Guatopo forest, Edo. Miranda, 27.6.1958, *Dennis* 1119.

Pseudohiatula fuliginosa *Dennis*, sp. nov.

Pileus submembranaceus, e campanulato expansus, striatus, griseo-fuscidulus ('Drab' Ridgway), glaber; caro concolor; lamellae subdistantes, 5 mm. latae, albidae vel alutaceae, acie fimbriatae; stipes aequalis, fistulosus, 3 cm. longus, 2 mm. crassus, pallide griseo-fuscidulus ('Pale Drab-gray'), pruinosus; sporae ellipsoideae, vix amyloideae, 8–10 × 4–4·5μ; cheilocystidia cylindraceo-ventricosa, tenuitunicata, 75–105 × 12–14μ; pleurocystidia crassitunicata, 100 × 11μ. Fig. 40.

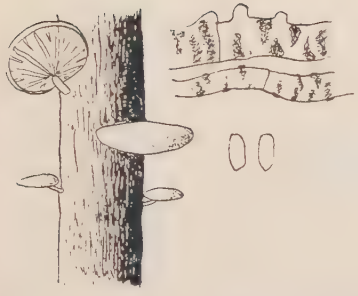


Fig. 39. *Micromphale inodorum*. Hyphae from the pileus-surface and spores × 660.

Fig. 40. *Pseudohiatula fuliginosa*. Spore, pleurocystidium (left) and cheilocystidium (right) × 660.

Hab. 2000 m., in silvis, El Avila, Dto. Federal, 13.6.1958, *Dennis* 1046 (typus).

Pileus-surface formed of broad, short-celled, thin-walled hyphae bearing thick-walled cystidia like the pleurocystidia, about 100–110 × 11–15μ; hairs of the stipe thin-walled like the cheilocystidia; trama yellowish in Melzer's reagent. Differs from *Collybia mycenoïdes* Dennis in the striate pileus and downy stipe and from *P. irrorata* in the nonhymeniform surface, larger spores and longer nonmuricate cheilocystidia.

Pseudohiatula sphaerospora *Dennis*, sp. nov.

Pileus submembranaceus, 18 mm. latus, campanulatus, umbonatus, fuliginus, ('Mummy Brown' Ridgway), margine striatus, glaber; caro alba; lamellae subdistantes, 2·5 mm. latae, albidae, acie albo-pruinosae, postice adnato-uncinatae; stipes aequalis, 3·5 cm. longus, 2 mm. crassus, albus, atropunctatus, fistulosus; sporae globosae, 5–6μ diam., apiculatae, vix amyloideae; cystidia cylindraceo-ventricosa, crassitunicata, hyalina, 80–110 × 10–18μ. Fig. 41, p. 92.

Hab. in silvis, El Junquito, Dto. Federal, 10.6.1958, *Dennis* 1036 (typus).

Pileus-surface formed of parallel hyphae with inflated terminal cells 15–20μ broad, filled with grey-brown sap; trama light yellow in Melzer's reagent; cheilo- and pleuro-cystidia alike, hairs of the stipe similar in shape but thin-walled and filled with grey-brown sap, up to about 85 × 14μ.

Marasmius section **Androsacei**

Marasmius androsaceus (L. ex Fr.) Fr., Epicrisis Syst. Myc.: 383 (1838).

Pileus membranaceus, 3 mm. diameter, hemispherical, centre depressed, margin closely striate-sulcate, dark grey-brown, smooth; lamellae rather crowded, whitish, of two lengths, adnexed; stipe slender, wiry, smooth, black; pileus-surface with nodulose hyaline hyphae overlying a layer of reddish-brown encrusted hyphae 4–5μ wide. Basidia 4-spored, 20 × 6μ; pleurocystidia fusiform, hyaline, 25 × 5μ; cheilocystidia hyaline, clavate, 7μ wide, bearing numerous small rounded processes; gill trama yellow in Melzer's reagent; spores elliptical, nonamyloid, 6–8 × 3–4μ.

3440 m., on fallen leaves of *Polylepis sericea*, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1734.

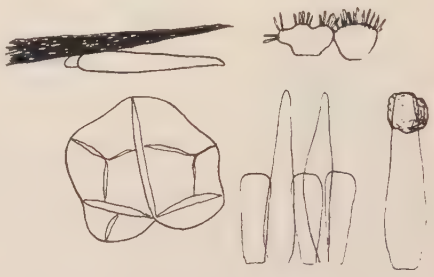


Fig. 41 (on left). *Pseudohiatula sphaerospora*. Cystidia and spores × 660.

Fig. 42 (above). *Marasmius cecropiae*. Carpophore seen from the side and from beneath × 10, broom-cells of pileus-surface, pleurocystidia and cheilocystidia × 660.

Section **Neosessiles**

Marasmius cecropiae *Dennis*, sp. nov.

Pileus membranaceus, 2 mm. latus, convexiusculus, sessilis, luride ochracei, glaber; lamellae paucae, angustae, distantes, venoso conjunctae, ochroleucae; pelliculae celluli ovoidei, 8–10μ diam. sursum verrucoso cum papillis 2–3μ longi; cheilocystidia et pleurocystidia fusoidea 35 × 6–8μ. Fig. 42.

Hab. in foliis emortuis *Cecropiae* praecipue ad nervos crassiores, in silvis, Guatopo, Edo. Miranda, 25.6.1958, *Dennis* 1427 (typus).

Gill-trama reddish-brown with Melzer's reagent, spores not recovered but basidia 20 × 7μ.

Section **Globulares**

Marasmius niveus Mont. in Ann. Sci. Nat., Bot. Ser. 4, 1: 117 (1854).

About 900 m., on dead sticks, Rio Chacaito, Caracas, 18.11.1949, *Dennis* 265B.

Section **Sicci**

Marasmius actinopus Mont. in Ann. Sci. Nat., Bot. Ser. 4, 1: 112 (1854).

About 900 m., in dead sticks, Rio Chacaito, Caracas, 18.11.1949, *Dennis* 397.

Marasmius atrorubens (Berk.) Berk. in Hook., Journ. Bot. 8: 137 (1856).

Marasmius castaneus Mont. in Ann. Sci. Nat., Bot. Ser. 4, 1: 109 (1854).

About 900 m., on dead leaf, Rio Chacaito, Caracas, 18.11.1949, *Dennis* V19.

Spores 13–16 × 3μ. Already recorded by Patouillard & Heim from Guasdualito, Edo. Apure, but without description so that it is impossible to say what species they had. The name *M. atrorubens* has been generally misinterpreted as at least four species were confused under it by Berkeley himself in later years.

Marasmius bellus Berk. in Hook., Journ. Bot. 8: 139 (1856)

800 m., on fallen twigs on wet forest-floor, Guatopo, Edo. Miranda, 25.6.1958, *Dennis* 1104. Fig. 43, p. 94.

Spores 11–13 × 3·5–4μ. Differs from *M. berteroi* and *M. rhabarbarinus* in the light yellow pileus. *Dennis* 42D, from Trinidad, is the same species.

Marasmius berteroi (Lev.) Murr. in N. Amer. Fl. 9: 267 (1915).

100 m., on debris in coffee plantation, Chichiriviche, Dto. Federal, 6.7.1958, *Dennis & Aristeguieta*; 900 m., on dead wood and leaves, Botanic Garden, Caracas, 9.6.1958, *Dennis* 1019, 1017.

Spores 12–17 × 3–4μ. As interpreted by Singer *M. rhabarbarinus* Berk. differs in its longer spores and narrower lamellae and in the basal tomentum being fulvous instead of white.

Marasmius cladophyllus Berk. in Hook., Journ. Bot. 8: 138 (1856).

800 m., on forest debris. Guatopo, Edo. Miranda, 22.6.1958, *Dennis* 1188.

Marasmius confertus Berk. & Br. in Journ. Linn. Soc., Bot. 14: 35 (1873).

Pileus up to 2·5 cm. diameter, campanulate, convex, ochraceous tawny, striate-sulcate to the disc; lamellae cream, crowded, adnate, of three lengths, narrow, edge concolorous; stipe 2–3 mm. thick, long, smooth, hollow, ochraceous tawny with white apex and darker base. Pileus-surface formed by broom-cells 6–8μ wide with stout processes about 6 × 1μ; cheilo-

cystidia similar but hyaline, pleurocystidia cylindrical, 35 × 6–7μ, gill-trama strongly pseudoamyloid, spores tear-shaped, 11–14 × 2·5–3·5μ, nonamyloid. Fig. 44.

800 m., densely caespitose on forest debris, Guatopo, Edo. Miranda, 25.6. 1958, *Dennis* 1107.

This differs from *M. rhabarbarinus* in its caespitose habit, and ochraceous-tawny less expanded pilei with crowded gills. From *M. leoninus* Berk. it differs in colour, habit and smaller spores. According to Petch *M. confertus* as found in Ceylon has spores 11–13 × 3μ but the lamellae of the type are even more crowded than those of *Dennis* 1107.

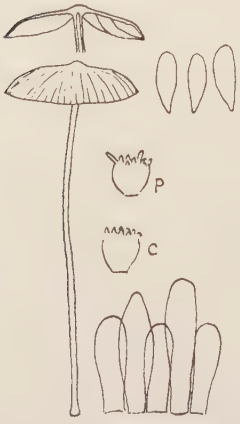


Fig. 43 (above). *Marasmius bellus*. Spores, broom-cells of pileus-surface (P), cheilocystidia (C) and pleurocystidia × 660.

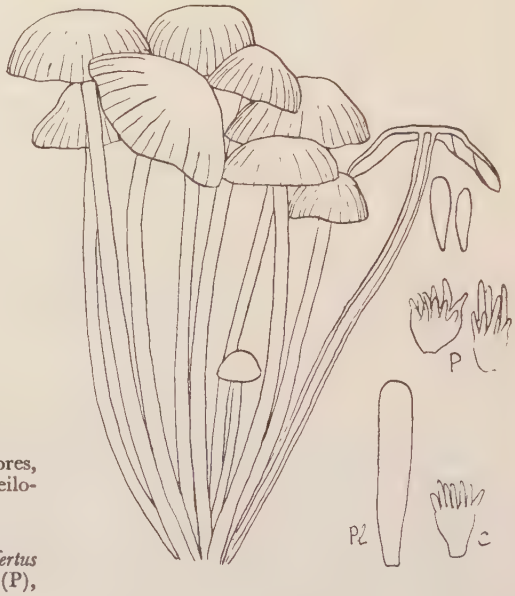


Fig. 44 (on right). *Marasmius confertus* Spores, broom-cells of pileus-surface (P), pleurocystidia and cheilocystidium × 660.

Marasmius ferrugineus Berk. in Journ. Linn. Soc., Bot. 10: 297 (1869).

Marasmius gardneri Sing. in Sydowia 12: 114 (1959).

About 100 m., on bamboo litter in coffee plantation, Chichiriviche, 6.7.1958, *Dennis & Aristeguieta* 1149; 900 m., on dead leaves, Botanic Garden, Caracas, 19.6.1958, *Dennis* 1021 & 1021A.

Dennis 1021 has spores 19–21 × 3–4μ, 1021A has them 14–18 × 3–3·5μ, but Singer's spore-range for *M. gardneri* (15·5–22 × 2·8–4·3μ) covers both collections.

Marasmius panerythrus Sing., sp. nov., ined.

Pileus membranaceus, campanulate, 2 cm. diameter, very dark purple, sulcate-striate, hymenial surface lilaceous; lamellae about 20, distant, pointed at each end, free, remote from the stipe so as to leave a brown disc around its apex, lilaceous, edge dotted brown; stipe cylindrical, smooth, horny, blackish-brown below, paler above, 8 cm. long, 1 mm. thick, Cells of the

pileus-cuticle with cylindrical papillae 1μ thick and up to 12μ long; cheolocystidia similar; spores tear-shaped, 11–14 × 3–4μ; gill-trama deep wine-red in Melzer's reagent. Fig. 45.

1300 m., on dead leaves in forested ravine, Los Guayabitos, Edo. Miranda, 8.6.1958, *Dennis & Foldats* 1011.

M. tucumanus Sing. is smaller and has the lamellae adnate to adnexed. This fungus is very like *Spruce* 101, 105 and 106, from Ipanuré, which Berkeley misdetermined as his *M. atrorubens*, but in Spruce's material the lamellae appear to have been whitish and adnate to the stipe. *M. leveillanus* (Berk.) Pat. is superficially similar but has broom-cells with short stout lobes whereas in *M. panerythrus* broom-cells 8μ diameter bear dark brown slender processes 5–6 (–12)μ long. According to Petch the spores of *M. leveillanus* are 8–10 × 3–4μ. *M. phaeus* Berk. & Curt., from Cuba, seems to have been more brown and to have had fewer more distant lamellae.

Fig. 45. *Marasmius panerythrus*. Spores, cheilocystidium (C) and broom-cells of the pileus-surface (P) × 660.

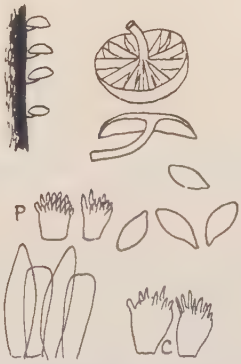


Fig. 46. *Marasmius guatopoënsis*. Carpophores natural size and enlarged, broom-cells of the pileus-surface (P), spores, pleurocystidia and cheilocystidia × 660.

Marasmius guatopoënsis *Dennis*, sp. nov.

Pileus membranaceus, convexus, 2–3 mm. latus, luride incarnatus ('Orange Cinnamon' Ridgway), glaber; lamellae subdistantes, arcuatae, postice adnatae, albae, pallescentes; stipes brevis, curvatus, glaber, pileo concolor, basi albo-hirsutus; pelliculae celluli ovoideo-rotundati, 6–10μ diam. sursum verrucosi; sporae ovato-oblongae, 9–11 × 4–4·5μ. Fig. 46.

Hab. in caule mortuo Filicis, in silvis, Guatopo, Edo. Miranda, 25.6.1958, *Dennis* 1103 (typus).

The broom-cells of the pileus-surface are hyaline with short light-brown processes, the cheilocystidia are similar but hyaline throughout, the pleurocystidia are mere fusiform basidioles scarcely longer than the basidia. Trama deep red-brown with Melzer's reagent. The species is akin to the

North American *M. pusio* Berk. & Curt. which has a relatively much longer stipe.

Marasmius haedinus Berk. var. *minor* Dennis in Trans. Brit. mycol. Soc. 34: 421 (1951).

800 m., on midrib of fallen leaf in forest, Guatopo, Edo. Miranda, 27.6.1958, *Dennis* 1389.

Marasmius haematoccephalus (Mont.) Fr. var. *pseudotageticolor* Sing. in Sydowia 12: 120 (1959).

900 m., Botanic Garden, Caracas, 9.6.1958, *Dennis* 1010A.

Spores 18–21 × 3–4μ. Fig. 47.

Fig. 47. *Marasmius haematocephalus* var. *pseudotageticolor*. Spore and pleurocystidia × 660.

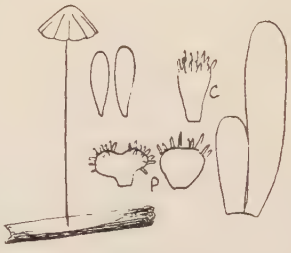


Fig. 48. *Marasmius pallescens*. Spores, broom-cells of the pileus-surface (P), cheilocystidium (C) and pleurocystidium × 660.

Marasmius pallescens Murr. in N. Amer. Fl. 9: 261 (1915).

Pileus broadly campanulate, 7 mm. diameter, lilac, radiately striate-sulcate; lamellae about 10, equal, free; stipe slender, wiry, black, arising from a patch of white mycelium. Pileus-surface formed by broom-cells 8–10μ wide, bearing slender processes up to 3μ long; cheilocystidia similar but hyaline, pleurocystidia abundant, vesicular, 35–40 × 10μ, basidia 20 × 7μ, spores tear-shaped 11–14 × 3·5μ. Fig. 48.

950 m., on fallen petioles in Botanic Garden, Caracas, 20.6.1958, *Dennis* 1172.

Differs from *M. wilsoni* Murr. in the distant gills with concolourous margin, from *M. ferrugineus* Berk. in colour and smaller spores, and from *M. tageticolor* Berk. in stature, colour and smaller spores. *M. subrotula* Murr. has similar stature and spores but was described as flesh-colour with a yellowish disc and I did not note pleurocystidia in the type.

Marasmius personatus Berk. & Curt. in Journ. Linn. Soc., Bot. 8: 297 (1869).

Pileus convex, 1 cm. diameter, smooth, white, drying yellow, closely striate towards the margin; lamellae crowded, of three lengths, cream, edge concolorous; stipe dark brown, minutely downy, apex white, base white-strigose and associated with a patch of white mycelium. Pileus-surface formed by hyaline broom-cells, 10–12μ across with very short

rounded processes; cheilocystidia similar, pleurocystidia fusiform, 20 × 6μ, only their tips protrude above the basidia, gill-trama deeply pseudo-amyloid; spores tear-shaped, 10-14 × 2·5-3·5μ; hairs of the stipe hyaline, cylindrical, about 40 × 4μ. Fig. 49.

950 m., on sticks, Botanic Garden, Caracas, 9.6.1958, *Dennis* 1022.

Fig. 49. *Marasmius personatus*. Hairs of the stipe, spores, pleurocystidia and cheilocysitdia (C) × 660.

Fig. 50. *Marasmius venezuelanus*. Broom-cells of pileus-surface (above), cystidia (right) and spore × 660.

Marasmius rhabarbarinus Berk. in Hook., Journ. Bot. 8: 135 (1856).

3440 m., on forest litter, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1746.

Spores 17–23 × 4–5μ. Differs from *M. leoninus* Berk. in the subdistant lamellae which are almost all equal.

Marasmius tageticolor Berk. in Hook., Journ. Bot. 8: 136 (1856).

1300 m., on dead leaves in forested ravine, Los Guayabitos, Edo. Miranda, 8.6.1958, *Dennis & Foldats* 1010.

Marasmius trinitatis Dennis in Trans. Brit. mycol. Soc. 34: 425 (1951).

800 m., on forest debris, Guatopo, Edo. Miranda, 22.6.1958, *Dennis* 1190.

Marasmius venezuelanus *Dennis*, sp. nov.

Pileus carnosulus, 3 cm. latus, e convexo explanatus, margine striatus, glaber, albido-stramineus; lamellae confertae, ex albo alutaceae, sublente

puberulus, postice adnexae; stipes aequalis, 4 cm. longus, 1 mm. crassus, fistulosus, deorsum rufo-fuscus, apice albidus, hirsutulus; sporae oblongo-ovatae, 8–9 × 3μ. Fig. 50, p. 97.

Hab. ad frustula lignea etc. in silvis, El. Avila, Dto. Federal, 13.6.1958, *Dennis* 1052 (typus).

Also seen but not collected in similar forest at El Junquito. The pileus-surface is covered by a hymeniform layer of subglobose, thin-walled, hyaline cells, 10–20μ across, having interspersed among them thick-walled, brown, broom-cells 7–13μ diameter and occasional short, simple or forked, brown setae. The lamellae bear numerous, ventricose, pointed, thick-walled, brown setae 60–90 × 11–17μ and the gill-trama is strongly pseudoamyloid. There is no distinctive smell. This is clearly closely allied to *M. jalapensis* Murr., from which it chiefly differs in the numerous smooth-walled hyaline cells on the pileus-surface among the brown broom-cells. It differs from *M. cohaerens* (Alb. & Schw. ex Fr.) Cooke & Quél. in its downy stipe and from *M. lupuletorum* Weinm. in the setulose lamellae.

Section **Rotulae**

Marasmius aciculaeformis Berk. & Curt. var. **albus** *Dennis*, var. nov.

A typo differt pileo albo; sporae 7–9 × 4μ.

900 m., ad frustula lignea, Caracas, 9.6.1958, *Dennis* 1023 (typus).

Marasmius buzae *Dennis*, sp. nov.

Pileus membranaceus, 7 mm. latus, campanulatus, subumbilicatus, sulcato-plicatus, glaber, ochraceus ('Orange Buff'), interdum umbilico fuscus; lamellae 12 circiter, aequales, distantes, latae, postice in collarium liberum conjunctae, albae, acie ochraceo-punctae; stipes corneus, 6·5 cm. longus, glaber, niger; pelliculae celluli ovoidei 10–12μ diam. sursum verrucosi; sporae ovoideae, 10–12 × 5·5–7μ. Fig. 51.

Hab. 3440 m., ad folia coacervata, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 1.8.1958, *Dennis* 1775 (typus).

Cheilocystidia similar to the broom-cells of the pileus surface, with short brown processes, pleurocystidia absent, basidia 30 × 9μ, trama pseudo-amyloid. Black wiry rhizomorphs are associated with the fructifications. Possibly this may be *M. bulliardi* Quél. var. *papillata* Theiss. in Broteria, Ser. Bot. 8: 55 (1909), described with spores 9-12 × 5·5–7μ, but it appears quite distinct from Quélet's species.

Marasmius minimus *Dennis*, sp. nov.

Pileus membranaceus, 1·5–2 mm. diam., umbrinus ('Brussels Brown' Ridgway), convexus, radiato-sulcatus; lamellae 8–10 circiter, aequales, distantes, postice in collarium liberum conjunctae, ochroleucae; stipes corneus, 4–6 mm. longus, glaber, niger, apice pallidior; pelliculae celluli ovoidei, 10–17μ diam. sursum verrucosi; sporae ellipticae, 6–7 × 2–2·5μ. Fig. 52.

Hab. 900 m., ad ramulos dejectos, Caracas, 19.6.1958, *Dennis* 1068 (typus).

Pileus surface formed by subglobose cells with thin brown walls bearing on their outer surface numerous minute hemispherical processes up to 1μ long; cheilocystidia similar; pleurocystidia absent; trama yellowish in Melzer's reagent. This differs from *M. graminum* and its allies not only in its darker pileus but also in the non-pseudoamyloid trama and from *M. trichorhizus* Speg. in colour and absence of a prominent umbo. Macroscopically it resembles *M. symbiotes* Theiss. in Broteria, Ser. Bot. 8: 56 (1909) which, however, had pileus 'stramineo-albido' and spores 7–8 × 5·5μ.

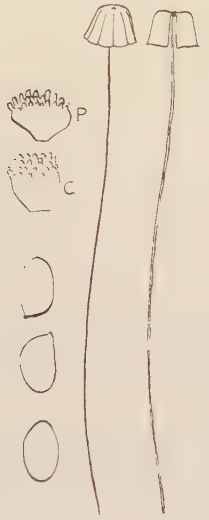


Fig. 51. *Marasmius buzae.* Broom-cell of pileus-surface (P), cheilocystidium (C) and spores × 660.

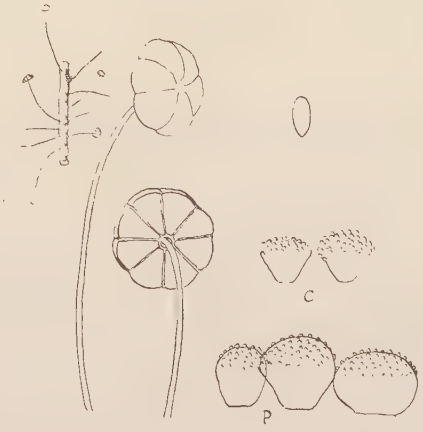


Fig. 52. *Marasmius minimus.* Carpophores natural size and enlarged, spore, cheilocystidia (C) and broom-cells of the pileus-surface (P) × 660.

Marasmius rubromarginatus Dennis in Trans. Brit. mycol. Soc. 34: 415 (1951).

2450 m., Mt. Periquito, Rancho Grande, Edo. Aragua, 22.11.1949, *Dennis* 339.

Marasmius ruforotula Sing. var. *latispora* Sing. in Sydowia 12: 137 (1959).

900 m., on dead *Bauhinia* leaf and other debris, Botanic Garden, Caracas, Dto. Federal, 9.6.1958, *Dennis* 1020; on dead leaves of *Musa* &c., Cortada del Guayabo, 1200 m., Edo. Miranda, 9.7.1958, *Dennis* 1147.

Spores 7–9 (–10) × 3·5–5μ. Fig. 53, p 100.

This differs from *M. graminum* (Lib.) Berk. var. *brevispora* Dennis chiefly in not growing on *Gramineae*.

Marasmius sp.

Pileus 2 mm. diameter, convex, whitish, translucent, smooth, sulcate-striate; lamellae subdistant, of two lengths, adnexed, white; stipe excentric, short, slender, equal, white-pruinose, arising from a small white pad of mycelium; trama strongly pseudo-amyloid, broom-cells of the pileus 8μ diameter, colourless, with very short obtuse processes; cheilocystidia similar,

hyaline, 12–17 × 7–10μ; pleurocystidia cylindrical, obtuse, 33–36 × 7–9μ. Spores not seen. Fig. 54.

2000 m., on dead branch, El Avila, Dto. Federal, 13.6.1958. *Dennis* 1368B.

It seems undesirable to propose a name for this rather distinctive little species until fertile material is available.

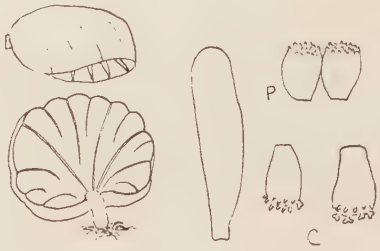


Fig. 53 (on left). *Marasmius ruforotula* var. *latispora*. Broom-cells of the pileus-surface (P), cheilocystidium (C) and spores × 660.

Fig. 54 (above). *Marasmius* sp. Broom-cells of the pileus-surface (P), cheilocystidia (C) and pleurocystidium × 660.

Hymenogloea papyracea (Berk. & Curt.) Sing. in Lilloa 22: 343 (1951).

Craterellus papyraceus Berk. & Curt. apud Berk. in Trans. Linn. Soc. Lond. 22: 129 (1857).
Stereum riofrioi Pat. in Bull. Soc. mycol. France 8: 117 (1892).
Hymenogloea riofrioi (Pat.) Pat., Essai taxonomique: 146 (1900).
Libellus papyraceus (Berk. & Curt.) Lloyd, Letter 45, p. 6 (1913).

Pileus up to 9 cm. diameter, convex, centre umbilicate, smooth, dry, ochraceous orange, drying Brazil Red (Ridgway), flesh very thin, hymenial surface smooth, cream coloured. Stipe up to 15 cm. × 3 mm., cylindrical, slightly enlarged towards the base, horny, polished, blackish-brown with a paler apex, hollow, arising from a mat of pale buff mycelium. Pileus-surface a hymeniform layer of subglobose cells 10–15μ diameter with thin smooth outer walls; tramal hyphae thin-walled, 5–6μ wide, hyaline, stained reddish-brown with Melzer's reagent; cystidia absent, spores tear-shaped, hyaline, nonamyloid, 11–12 × 3–4μ, print white.

Leg. *Fendler* s.n. (typus), presumably from the forests of the Sierra de la Costa near Colonia Tovar, Edo. Aragua, about 1856; c. 2200 m., on litter in dense wet forest above La Mucuy, Sierra Nevada, Edo. Mérida, 6.8.1958. *Dennis* 1787; on stumps, Gulea, Prov. Pichincha, Ecuador, January 1892 leg. *R. Riofrio* (typus of *S. riofrioi* in Herb. Farlow).

This beautiful fungus has impressed all who have written of it. Berkeley compared the colour of the dried pileus to the autumn colours of *Ampelopsis quinquefolia* and added 'It is altogether one of the most charming species with which I am acquainted'. Patouillard recognised its resemblance to a gill-less *Marasmius* (=*Androsaceus* Pat.) and considered the possibility of it being 'une deformation de quelque espèce de ce dernier genre', a possibility which he acutely rejected because of the smooth-walled cuticular cells. Lloyd commented 'This is a most striking and peculiar plant; no other, as far as I know, is in any way similar'. Singer remarked that no one had seen spores of *Hymenogloea* and thought it possible it was merely a juvenile stage of some unknown large species of *Marasmius*. *Dennis* 1787 is abundantly fertile so that the status of the species and genus is no longer in doubt.*

Crinipellis foliicola Sing., in Mycologia 47: 771 (1955).

900 m. on dead leaves under trees, Botanic Garden, Caracas, Dto. Federal, 19.6.1958, *Dennis* 1071A.

Crinipellis megalospora Sing. in Lilloa 25: 222 (1952).

About 1000 m., at base of living culms of grass, lower slopes of La Silla above Los Palos Grandes (Caracas), Edo. Miranda, 13.7.1958, *Dennis* 1651.

Crinipellis stupparia (Berk. & Curt.) Pat., Essai Taxonom. Hymen.: 143 (1900).

1800 m., on dead leaves in forest, El Junquito, Dto. Federal, 10.6.1958, *Dennis* 1030.

Dr. R. Singer has kindly supplied the above three determinations in *Crinipellis*.

Crinipellis rubidus Pat. & Heim was said to be common in the state of Apure in 1923–24. *C. bisulcata* (Pat. & Gaill.) Pat. and *C. excentrica* (Pat. & Gaill.) Pat. were described from the upper Orinoco.

Chaetocalathus liliputianus (Mont.) Sing. in Lilloa 8: 527 (1943).

1800 m., on sticks in cloud-forest, El Junquito, Dto. Federal, 10.6.1958, *Dennis* 1165.

Mycena citricolor (Berk. & Curt.) Sacc., Syll. Fung. 5: 263 (1887).

1600 m., on coffee leaves, Rio Chama valley below Mérida, July 1958, *Dennis* 2349.

Recorded on the same host by Cooke, as *Stilbum flavidum* Cooke, from a collection by Dr. Ernst, 1880, by Chardon & Toro from the same locality at Mérida and from the states of Aragua and Miranda, by Sydow from *Inga spectabilis* leaves at El Limon, and by Wolf from coffee in Carabobo and from orchid leaves in Aragua.

Mycena dennisii Sing., in Sydowia 9: 394 (1956).

About 900 m., on soil, Rio Chacaito, Caracas, Nov. 1949, *Dennis* 398.

*Singer, in Sydowia 14: 276 (1960) has described collections of *H. papyracea* from Colombia and Bolivia with spores 8·3–9·7 × 3–4μ.

Mycena domingensis *Dennis*, sp. nov.

Pileus membranaceus, 7 mm. latus, convexo-umbilicatus, albus, striato-sulcatus, glaber; caro alba; lamellae distantes, aequales, 1·5 mm. latae, albae, arcuato-decurrentes; stipes filiformis, aequalis, 0·5 mm. crassus, albus, glaber; sporae oblongae, apiculatae, amyloideae, 4–6 × 2–2·5μ; basidia tetraspora, 20 × 4μ; cheilocystidia ventricosa, hyalina, 40 × 7–9μ. Fig. 55.

Hab. ad truncos excisos in silvis, dense lateque gregaria, 3440 m., Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 1767.

The tips of the cheilocystidia are often crowned by a gummy exudate.

Fig. 55. *Mycena domingensis*. Spores, basidium and cheilocystidium × 660.

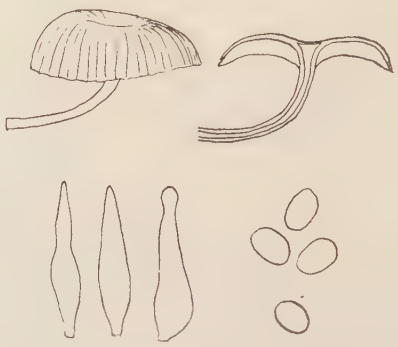


Fig. 56. *Mycena emeritensis*, Cheilocystidia and spores × 660.

Mycena emeritensis *Dennis*, sp. nov.

Pileus submembranaceus, 2·5 cm. latus, e convexo subcampanulato explanato-depressus, sulcato-striatus, luride ochraceus ('Chamois' Ridgway), glaber, glutinosus; caro pilei alba, stipitis aurantiaca; lamellae confertae, arcuatae, 2 mm. latae, albae, aetate carneolae; stipes aequalis, 2–2·5 cm. longus, 2 mm. crassus, glaber, glutinosus, apice flavidus, deorsum aurantiacus, fistulosus; sporae ellipticae, vix apiculatae, amyloideae, 6·5–9 × 4·5–6μ; basidia tetraspora; cheilocystidia fusoideo-cuspidata, hyalina, 30 × 6–7μ; pleurocystidia nulla. Fig. 56.

Hab. 3440 m., ad ligna mucida, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1749 (typus).

The gelatinous layer of the pileus-surface, 125μ deep when soaked up in ammonia, contains sparse spiral hyphae 1μ wide; the hypoderm is formed of broad, thin-walled, hyphae and the gill-trama of compact thin-walled hyphae, 8–14μ wide, not at all gelatinised but feebly reddened in Melzer's reagent. There is a compact subhymenium. This differs from *M. leaiana* in the nongelatinised trama, white lamellae and hyaline cheilocystidia and from *M. lilacifolia* in the broader amyloid spores.

Mycena euspeirea (Berk. & Curt.) Sacc., Syll. Fung. 5: 287 (1887).

Pileus up to 2·5 cm. diameter, convex, then flattened at the disc, Cream Buff to Pale Isabelline, smooth and not noticeably viscid, striate to the

disc; flesh thin, flexible, pale isabelline, brown in the lower part of the stipe; lamellae rather close, of three lengths and closely interveined, 2–3 mm. broad, adnate, arched and horizontal, white to cream; stipe about 25 × 2 mm., grey-brown below, paler or white above, smooth, hollow, cartilaginous. Spores elliptic-cylindric, apiculate, amyloid, 4 × 2μ, basidia 4-spored, 20 × 4μ; cheilocystidia narrowly ventricose, 15–25 × 3–5μ, pleurocystidia similar but scanty; gill trama with a central core of broad pseudoamyloid hyphae and a thick strongly gelatinised subhymenium with radiating, branched, slender hyphae. Pileus surface apparently with a thin gelatinous pellicle and bearing a few slender thin-walled hairs like the cheilocystidia. Fig. 57.

About 1000 m., on logs, Mariposa, Edo. Miranda, 20.6.1958, *Dennis* 1049A; about 2000 m., on logs in cloud-forest, El Avila, Dto. Federal, 13.6.1958, *Dennis* 1049.

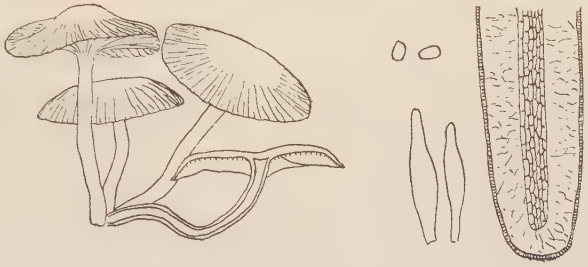


Fig. 57. *Mycena euspeirea*. Cheilocystidia and spores × 660, diagrammatic section of gill-edge slightly enlarged to show the gelatinised subhymenium.

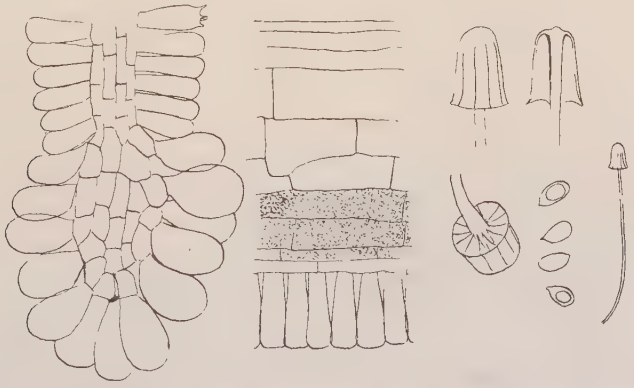


Fig. 58. *Mycena hepaticarum*. Carpophore natural size and enlarged, spores, section of pileus and section of gill-edge × 660.

Mycena haematopus (Pers. ex Fr.) Kummer var. *marginata* Lange in Dansk Bot. Ark. 1(5): 20 (1914).

3560 m., on dead branch beside the waterfall at head of Mucubaji valley, Sierra de Santo Domingo, Edo. Mérida, 23.7.1958, *Dennis & Buza* 1711. Seen also on trunk at 3440 m., Laguna Negra.

Mycena hepaticarum *Dennis*, sp. nov.

Pileus e cylindraceo campanulatus, 3·5 mm. longus, 2·5 mm. crassus, umbrinus ('Bister'), glaber, striatus, margine spadiceus; caro hygrophana, grisea; lamellae 14 circiter, aequales, adnato-uncinatae, cinereae; stipes aequalis, tenuis, 0·5 mm. crassus, spadiceus; sporae ellipticae, apiculatae, 5–6 (–7) × 3–3·5μ; basidia tetraspora, 15 × 5μ; cheilocystidia vesiculosa, hyalina, 15–20 × 8–10μ, pleurocystidia nulla. Fig. 58, p. 103.

Hab. ad *Hepaticas* in truncis vetustis in silvis, 1800 m., El Junquito, Dto. Federal, 10.6.1958, *Dennis* 1026 (typus).

Pileus-surface formed of prostrate yellowish hyphae overlying a hypoderm of broader, short-celled, hyaline hyphae which stain deep red brown in Melzer's reagent. These overlie about three layers of dark brown hyphae 6–7μ wide which are followed by the thin hyaline subhymenium and hymenium. The gill-trama is also strongly pseudo amyloid and non-gelatinised.

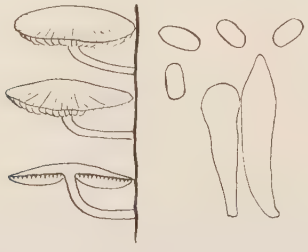


Fig. 59. *Mycena junquillina*. Spores, pleurocystidium and basidium × 660.

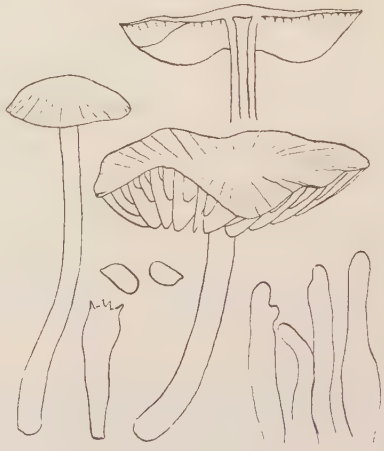


Fig. 60. *Mycena* near *M. pearsoniana*. Spores, basidium and cheilocystidia × 660.

Mycena junquillina *Dennis*, sp. nov.

Pileus 15–18 mm. latus, e convexo explanatus, glaber, flavus ('Light Cadmium' Ridgway), margine striatus; caro hygrophana; lamellae confertissimae, 1 mm. latae, postice adnexae, sulphureae ('Pinard Yellow'), venoso conjunctae; stipes aequalis, curvatis, brevis, 1·5 cm. longus, 1·5 mm. crassus, aurantiacus ('Xanthine Orange'), pruinosus, solidus; sporae oblongae, vix apiculatae, amyloideae, 6·5–8·5 × 3·5–4μ. Fig. 59.

Hab. 1800 m., ad ramos in silvis, El Junquito, Dto. Federal, 10.6.1958, *Dennis & Foldats* 1037 (typus).

Scattered fusoid but nonprotruding cells filled with yellow sap occur in the hymenium but no cheilocystidia were seen; trama pseudo-amyloid; hairs of the stipe thick-walled, undulating, obtuse, yellow, sometimes forked.

Mycena leptocephala (Fr.) Gillet, Hymenomycetes de France: 267 (1874).

Pileus 8 mm. diameter, campanulate, smooth, dry, grey-brown at the disc, shading to white at the margin, striate; lamellae steeply ascending,

narrow, adnate, light grey with a white edge, fimbriate under a lens; stipe slender, about 40 × 1 mm., cylindrical, minutely downy then smooth, grey-brown below, white above; spores broadly elliptical, amyloid, 7–11 × 4·5–5·75μ; cheilocystidia fusoid-ventricose, about 50 × 9μ or with a more swollen base and slender simple or forked beak about 17 × 2μ; hairs of the stipe cylindrical or slightly enlarged at the base, obtuse, thin-walled, hyaline, up to 125 × 5μ; smell nitrous or none; gill trama pseudoamyloid.

3440 m., in deep moss and attached to fallen leaves of *Polylepis sericea*, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis* 1745; 31.7.1958, *Dennis* 1764.

Mycena margarita (Murr.) Murr. in Mycologia 8: 220 (1916).

1800 m., on stump, El Junquito, Dto. Federal, 16.11.1949, *Dennis* 357.

Mycena osmundicola Lange in Dansk Bot. Arkiv. 1(5): 37 (1914), forma.

Pileus campanulate, 6 mm. diameter, light grey-brown with a white pruina, closely striate; lamellae steeply ascending, light grey with white edge; stipe white except at the base, which is ochraceus, covered with short white hairs throughout. Pileus-surface hyphae light brown with roughened walls, sphaerocysts hyaline, 33 × 28μ, covered with fine warts; cheilocystidia clavate, 25 × 15μ, warted; hairs of the stipe cylindrical, hyaline, about 50 × 17μ, warted throughout; spores elliptical, nonamyloid, 9–13 × 5–5·5μ (–6·5)μ; trama pseudoamyloid.

3440 m., on log, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 1.8.1958, *Dennis* 1773.

Dennis 1730, from the same area, differs in having the stipe white throughout with longer hairs, 65–135 × 9–19μ, cheilocystidia 23–45 × 9–22μ and smaller sphaerocysts with light brown walls, spores scanty, 8 × 6μ, on 4-spored basidia.

Two collections from El Junquito, 16.11.1949, *Dennis* V127, and 10.6.1958, *Dennis* 1377, are also states of *M. osmundicola*.

Mycena near *pearsoniana* Sing. in Sydowia 12: 233 (1958).

Pileus convex, then flattened, up to 35 mm. diameter, Vinaceous-russet, paler with age, striate to the disc, smooth, dry; flesh rather dark reddish brown; lamellae broad, subdistant, adnate, pinkish, much interveined; stipe cylindrical or slightly tapering upwards, concolorous, smooth, dry, hollow. Spores elliptic-cylindric, apiculate, 5–8 × 4μ, non-amyloid; basidia 4-spored; cheilocystidia narrowly ventricose, tip rounded, occasionally slightly lobed, thin-walled, hyaline, 30–35 × 4–8μ, no pleurocystidia. Smell faint, perhaps of radish but stronger and aromatic when dried. Fig. 60.

3440 m., on ground in forest, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 1.8.1958, *Dennis* 1776.

Mycena pseudocrocata Dennis in Trans. Brit. mycol. Soc. 34: 465 (1951).

2400 m., on soil in forest, Rancho Grande, Edo. Aragua, 19.11.1949, *Dennis* 344.

Mycena pura (Pers. ex Fr.) Kummer, Fuhrer Pilzkunde: 107 (1871).

3440 m., on ground in forest, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 1759.

Mycena sabali (Murr.) Murr. in Mycologia 8: 221 (1916).

About 800 m., solitary and in small groups on dead leaves on the forest-floor, Guatopo, Edo. Miranda, 27.6.1958, *Dennis* 1117.

Mycena umbilicata Dennis in Trans. Brit. mycol. Soc. 34: 469 (1951).

About 800 m., scattered on very rotten stump in forest, Guatopo, Edo. Miranda, 25.6.1958, *Dennis* 1102.

The original diagnosis should be corrected as follows: spores amyloid, trama strongly pseudoamyloid, cells of the pileus-surface with a finely warted exterior.

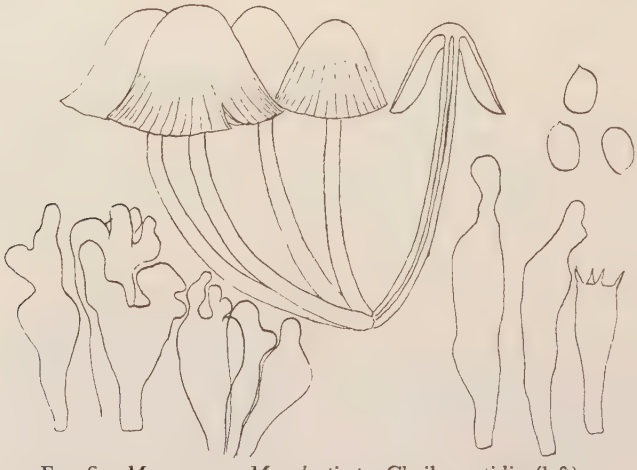


FIG. 61. *Mycena* near *M. rubrotincta*. Cheilo-cystidia (left), pleurocystidia (right) and spores × 660.

The following species cannot at present be precisely determined but are too large and conspicuous to be left without mention:

Mycena sp. near *M. rubrotincta* A. H. Sm.

Pileus up to 3 cm. diameter, campanulate, between Dresden Brown and Cinnamon Brown, smooth, dry, striate half way to the disc; flesh soft, very dark brown and watery in the pileus, paler in the stipe, without any coloured juice; lamellae ascending, 2–3 mm. wide, adnate, pale buff with whitish margin; stipe equal, about 4 cm. × 2 cm., hollow, same colour as the pileus below, paler above. Spores broadly elliptical, amyloid, 7–10 × 5·25–6·25μ; basidia 4-spored, 25–45 × 8–10μ; cheilocystidia thin-walled, hyaline, clavate, much lobed and irregular above, 25–40 × 9–20μ; pleurocystidia narrower, scarcely protruding from the hymenium, about 60 × 6–10μ, much less lobed, with oily contents; trama not pseudoamyloid, that of the gills composed of broad, subparallel, thin-walled hyphae, 7–8μ wide, filled with brown sap. Pileus-surface with smooth, hyaline, nongelatinised

hyphae 8–10μ wide overlying a hypoderm of about 3 layers of much broader hyphae, about 20μ wide, filled with brown sap. Fig. 61.

3440 m., caespitose on logs, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1742.

Mycena parabolica (Fr.) Quél. *sensu* Dennis in Trans. Brit. mycol. Soc. 34: 467 (1951).

About 1800 m., on stumps in cloud-forest. El Junquito, 16.11.1949, *Dennis* 356; about 2000 m., subcaespitose or gregarious on logs in cloud-forest, El Avila, Dto. Federal, 13.6.1958, *Dennis* 1050.

Mycena species 1

Pileus 7·5 cm. diameter, flattened, smooth, dry, Light Brownish Olive, paler but striate towards the margin; flesh thin, brownish under the cuticle of the pileus, very pale grey elsewhere; lamellae distant, 7 mm. broad, adnate with a tooth, light grey, not interveined; stipe equal, cartilaginous, hollow, 6 cm. long, 7 mm. thick, Light Greyish Olive. Spores subglobose, 5 × 4·5μ, with a large oil drop, amyloid, basidia 4-spored; pileus-surface formed of broad radiating hyphae, trama pseudoamyloid, with hyphae 25–30μ wide. Gill edge much eroded and cheilocystidia not found. In the fresh material I thought I could see embedded pleurocystidia, ventricose, 10–11μ wide, but have been unable to confirm this from the dried specimen. Smell slightly unpleasant.

About 100 m., on decorticated wood, Mariposa, Edo. Miranda, 20.6.1958, *Dennis & Aristeguieta* 1086.

In view of the ambiguity about the cystidia this large and conspicuous species cannot be adequately characterised.

Mycena species 2.

Pileus hemispherical, 5 mm. diameter, pale sepia, darker at the slightly depressed disc, striate, dry, smooth; lamellae of two lengths, broadly adnate, horizontal, white with a dark brown margin; stipe 30 × 0·5 mm., light grey-brown shining, dry. Pileus-surface formed of thin-walled radiating hyphae 10–18μ wide, with thin walls bearing dark superficial granulations; hypoderm composed of thin-walled globose cells 25–30μ across, subhymenium and most of the gill-trama formed of thin-walled hyphae 4–5μ wide, the whole tissue strongly pseudoamyloid. Pleurocystidia none, basidia 20–22 × 10–11μ, sterigmata and spores not seen, cheilocystidia dark brown, with abundant short processes.

800 m., solitary on wood, Guatopo forest, Edo. Miranda, 25.6.1958, *Dennis* 1192.

Though I have not found a description to fit this small but rather striking fungus it seems unwise to found a new species on a sterile collection.

Delicatula crispula (Quél.) Pat., Essai Taxon. Hymen.: 157 (1900).

Pileus about 3 mm. diameter, conical then conico-campanulate, white, translucent, not striate, appearing smooth to the naked eye; lamellae absent or reduced to folds, hymenial surface smooth and white; stipe short, slender,

hyaline-white, downy, without a basal disc. Spores pip-shaped, 5–7 × 3·5–4μ, nonamyloid, basidia 4-spored; hairs of the pileus borne in a ring round the margin of the disc, thick-walled, hyaline, about 70 × 7μ, those of the stipe simple, cylindrical, thin-walled, non-encrusted, sometimes 1-septate, up to 70 × 2·5μ; no cystidia, trama not pseudoamyloid; stipe solid, composed of parallel broad hyphae rather sharply differentiated from those of the pileus. Fig. 62.

About 2000 m., in a small cluster on rotten wood in cloud-forest, El Avila, Dto. Federal, 4.7.1958, *Dennis* 1138.

Filoboletus gracilis (Klotzsch ex Berk.) Sing. in Lloydia 8: 216 (1945).

About 50 m., on logs, Chichiriviche, Dto. Federal, 6.7.1958, *Dennis & Aristeguieta* 1094A; about 800 m., Guatopo forest, Edo. Miranda, 22.6.1958, *Dennis* 1094.

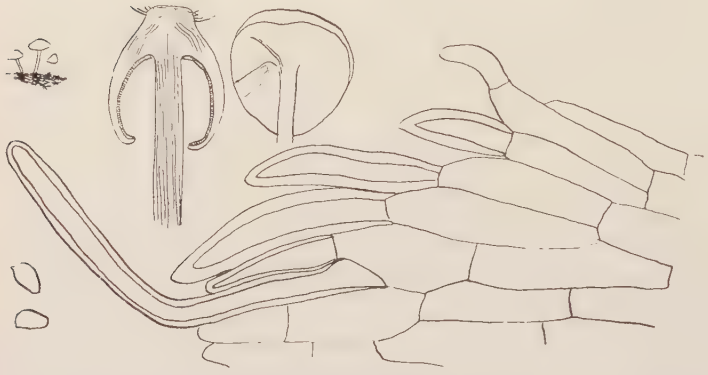


FIG. 62. *Delicatula crispula*. Carpophores natural size and, with section, enlarged; section of umbo-margin and spores × 660.

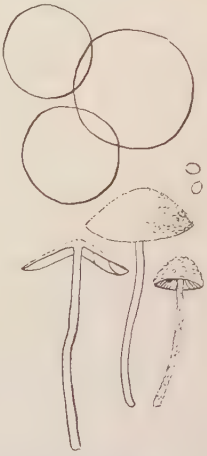


FIG. 63. *Cystoderma luteo-hemisphaericum*. Sphaerocysts and spores × 660.

Filoboletus manipularis (Berk.) Sing. in Lloydia 8: 215 (1945).

900 m., on stump, Botanic Garden, Caracas, 11.6.1958, *Dennis* 1041; 1800 m., on log, El Junquito, 16.11.1949, *Dennis* 353; 2000 m., cloud-forest, El Avila, 17.6.1958, *Dennis* 1041A, all from Dto. Federal.

AMANITACEAE

Volvariella bombycina (Schaeff. ex Fr.) Sing. var. **microspora** *Dennis*, var. nov.

A typo sporis 6–7·5 × 4–5μ recedit.

Hab. 1300 m., ad truncos vetustos in silvis, Los Guayabitos, Miranda, 8.6.1958, *Dennis* 1003 (typus).

This variety, fully described but not named in Bull. Soc. mycol. France 69: 147 (1953), has a Strontian Yellow pileus with a brown-blotched volva and evidently has consistently smaller spores than *V. bombycina* var. *bombycina*

of Europe. It seems distinct from *Volvaria diplasia* (Berk. & Br.) Sacc., of Ceylon, which has spores up to 10 × 6μ but may prove to be the same as *V. ilicicola* Speg., the spores of which are unfortunately not described. According to Shaffer (1957) *V. bombycina* var. *flaviceps* (Murrill) Shaffer, which has a bright yellow pileus and cheilocystidia like those of var. *microspora*, has spores 7·2–10 × 4·7–6·5μ.

Volvariella lepiotospora Sing. in Mycologia 47: 774 (1955).

About 1000 m., on rotting grass, Los Palos Grandes (Caracas), Edo. Miranda, 29.6.1958, *Dennis* 1123.

Distinguished by its very small spores, 5–6·5 × 3–3·5μ.

AGARICACEAE

Cystoderma amianthinum (Scop. ex Fr.) Fayod in An. Sci. Nat., Sér. Bot. 7, 9: 351 (1889).

Scattered; pileus conico-campanulate, then expanded, up to 3 cm. diameter, Naples Yellow to Mustard Yellow, surface mealy; flesh concolorous, thick at the disc, thin at the margin; lamellae rather crowded, of several lengths, adnate, up to 5 mm. broad, Ivory Yellow to Massicot Yellow; stipe cylindrical, up to 35 × 3–5 mm., whitish above the narrow inferior ring, coarsely mealy and concolorous with the pileus below, hollow. Pileus-surface covered with thin-walled, smooth, sphaerocysts, up to 30μ diameter, their walls stained red-brown by ammonia; spores elliptic-cylindric, 5–6·5 × 3–3·5μ, amyloid, smooth; gill-edge fertile.

3560 m., abundant in short grass and on bare soil, paramo around Laguna Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 23.7.1958, *Dennis & Buza* 1709.

Cystoderma luteo-hemisphaericum *Dennis*, sp. nov.

Pileus hemisphericus dein conico-campanulatus, 15 mm. latus, floccoso-farinosus, luteus; caro in pileo lutea, in stipite brunnea; lamellae confertissimae, adnatae, luteae; stipes aequalis, fistulosus, purpureo-brunneis, infra annulum granulosus; annulus inferus, evanidus. Sporae subglobosae, 2·5 × 2μ, inamyloideae. Fig. 63.

Hab. ad terram in hortis, Caracas, 19.6.1958, *Dennis* 1066 (typus).

Gregarious on bare soil under tall grass; pileus Lemon Chrome, at first squamulose with loose granular scales, then even and mealy; lamellae light yellow; stipe 30 × 1 mm., purplish brown, paler above, mealy with patches of yellow sphaerocysts, ring obsolete. Sphaerocysts 20–30μ diameter, with thin smooth walls and yellow sap; no cystidia.

There is a general resemblance, apart from colour, to *Lepiota seminuda* (Lasch) Kummer, but I have referred the species to *Cystoderma* because the lamellae are not free and the stipe as well as the pileus is clothed with sphaerocysts.

Leucocoprinus venezuelanus *Dennis*, sp. nov.

Subcaespitosus; pileus membranaceus, e campanulato expansus, umbonatus, 3·5 cm. latus, fuscus, e sericeo mox in squamas subgranulosas secedens,

umbo levis, ceterum striato-sulcatus; caro alba, odore farinaceo; lamellae confertae, 5 mm. latae, liberae albidae; stipes subaequalis, leviter basi incrassatus, 55 × 3–6 mm., infra annulum pallide fuscus; annulus membranaceus, persistens, supra albus, infra umbrinus; sporae ovoideae, apice truncatae, 6–8 × 4–5μ, pseudamyloideae; cheilocystidia ventricosa 35 × 8μ. Fig. 64.

1200 m., ad terram, Cortada del Guayabo, Miranda, 9.7.1958, *Dennis* 1156 (typus); 950 m., Los Chorros, Caracas, 21.6.1958, *Dennis* 1087.

The squamule hyphae are greyish-brown, thin-walled, 6–7μ diameter and the stipe is easily detachable from the pileus. Examination of the type of *Lepiota longistriata* Peck, kindly sent on loan to Kew from the New York State Museum, has shown that its spores are slightly narrower than those of the above fungus and lack the germ-pore. There is a general resemblance to *Leucocoprinus brebissonii* (Godey) Locquin which has larger spores.

Fig. 64. *Leucocoprinus venezuelanus*. Spores × 660.

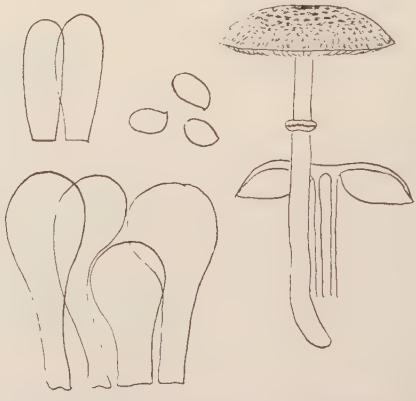


Fig. 65. *Lepiota epicharis* var. *occidentalis*. Cheilocystidia, spores and cells of pileus squamules × 660.

The fungus also bears considerable resemblance to *Lepiota subclypeolaria* (Berk. & Curt.) Sacc., though with fuscous rather than cream coloured disc and squamules. In the latter the stipe is white throughout and the spores are more elliptical, without a germ-pore. The spores of *Hiatula squamulosa* Mont. are also larger, 7–9·5 × 5–6·5μ, and more broadly ovoid, as are those of *Leucocoprinus magnusianus* (Henn.) Sing.

Leucocoprinus luteus (Bolt. ex Secr.) Locquin in Bull. Soc. Linn. Lyon 12 (6): 95 (1943).

1300 m., on forest debris, Los Guayabitos, Edo. Miranda, 8.6.1958, *Dennis & Foldats* 1160.

Lepiota bakeri Dennis in Kew Bull. 7: 483 (1953).

Pileus convex, 2·5 cm. diameter, flat at the disc, margin not striate, surface even, Verona Brown, continuous over the disc, elsewhere pulled apart into innumerable, minute, innate squamules, exposing the white flesh; flesh thick at the disc, thin at the margin, browning slightly in the stipe; lamellae crowded, of three lengths, free and terminating about ½ mm.

from the stipe, 3 mm. wide, white; stipe equal above a bulbous base, 30 × 3–4 mm., base 6–8 mm., smooth, white; ring ample, superior, membranous, white and striate above, margined Verona Brown below. Pileus-surface covered with prostrate, branched, unclamped hyphae, 6–8μ wide, with thin reddish-brown walls; cheilocystidia vesicular-clavate, 25–45 × 10–14μ; spores elliptical, thin-walled, 5–6·5 × 3–4μ, red-brown in Melzer's reagent.

900 m., two together on bare soil at foot of a bank, Botanic Garden, Caracas, Dto. Federal, 3.7.1958, *Dennis* 1129.

Lepiota epicharis (Berk. & Br.) Sacc. var. **occidentalis** *Dennis*, var. nov.

A typo differt pileo convexo-applanato.

Solitary; pileus convex, flattened or slightly depressed at the disc, 2·5 cm. diameter, disc smooth, Hay's Russet, remainder of surface cracking into minute, more or less concentrically arranged, concolorous squamules, exposing the whitish flesh, which may be stained yellowish towards the margin, which is not striate; flesh thin, white; lamellae rather crowded, ventricose, free, 4 mm. wide, white; stipe equal, 40 × 3 mm., hollow, surface finely white-fibrillose throughout; ring narrow, membranous, concolorous with the pileus and squamulose beneath. Squamules composed of a hymeniform layer of pyriform cells, 25–35 × 11–22μ, with thin reddish-brown walls; cheilocystidia vesicular, hyaline, 25 × 6–9μ; spores ovoid, 7–9 × 4–5μ, rather thick-walled but without a distinct germ-pore, dark red-brown in Melzer's reagent. Fig. 65.

About 50 m., in forest litter, Chichiriviche, Dto. Federal, 5.7.1958, *Dennis & Aristeguieta* 1145 (typus).

All specimens in the type collection of *L. epicharis*, from Ceylon, have campanulate pilei and, though the painting sent with them indicates no marginal striae, all the dried pilei are conspicuously marginally striate. This may be due to pressing but, as they are, they look different from *Dennis* 1145, which was not pressed. *L. johnsoni* Massee, from Ghana, is structurally similar but has a reddish-brown stipe and the pileus-surface between the squamules is similarly coloured.

Lepiota pseudoroseola Dennis in Kew Bull. 7: 476 (1953).

About 900 m., on soil in dry forest, Rio Chacaito, Dto. Federal, 18.11.1949, *Dennis* 393.

Lepiota guatopoënsis *Dennis*, sp. nov.

Pileus convexo-expansus, 2·5 cm. latus, aureo-rubellus, e sericello minutissime squamulosus; caro in pileo alba, in stipite ochracea; lamellae confertae, liberae, candidae, ventricosae; stipes subaequalis, fistulosus, ochraceus, fibrillosus; annulus membranaceus, inferus, supra albus, infra aurantiacus. Sporae ellipsoideae, 6–7 × 3–4μ. Fig. 66, p. 112.

Hab. c. 800 m., ad terram in silvis, Guatopo, Edo. Miranda, 25.6.1958, *Dennis* 1106 (typus).

Solitary, pileus Zinc Orange, Apricot Orange at the low umbo, surface radiately fibrillose, with the hyphae appearing pinched up into minute vague squamules over the disc; lamellae 2 mm. wide, white edge dotted

brown in places, distant from the stipe. Pileus-surface of prostrate red-brown hyphae, 7–11μ wide, their thin walls loosely encrusted with reddish granules, clamps not seen; cheilocystidia vesicular, thin-walled, hyaline, 20–22 × 7–10μ; spores yellowish, dark red-brown in Melzer's reagent.

L. guatopoënsis is closely allied to *L. pseudoroseola*, from which it differs in the coloured, encrusted, hyphae of the pileus-surface as well as in the coloured stipe and orange, rather than red, pileus. *L. subflavescens* Murr. differs in the pileus being lemon yellow.

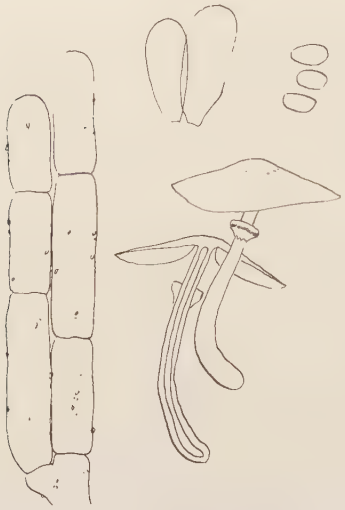


Fig. 66. *Lepiota guatopoënsis*. Hyphae of pileus-surface, cheilocystidia and spores × 660.

Fig. 67. *Lepiota ochraceo-lamellata*. Cheilocystidia, spores and hyphae of pileus-surface × 660.

Lepiota ochraceo-lamellata *Dennis*, sp. nov.

Pileus conico-campanulatus, umbonatus, 2·5 cm. latus, subcervinus, squamulosus; caro pallida; lamellae subconfertae, ventricosae, liberae, luteae; stipes aequalis, basi subincrassatus, fistulosus, pallidus, infra annulum floccoso-squamulosus, pileo concolor; annulus inferus, albidus, tenuis. Sporae ellipsoideae, luteae, 5–6 × 3–4μ. Fig. 67.

Hab. in terram in hortis, Caracas, 20.6.1958, *Dennis* 1076 (typus).

Solitary, pileus covered with pinched up patches of Fawn coloured fibrils on a Light Vinaceous Fawn base, margin appendiculate with triangular white teeth, not striate; lamellae 4 mm. wide, Primuline Yellow. Pileus-surface formed of matted, branched, prostrate hyphae, 4–6μ wide, walls thin, brown, bearing a reddish-brown incrustation, clamps not seen; cheilocystidia vesicular, thin-walled, hyaline, 20–30 × 7–9μ; spores ovoid, light yellow, dark red-brown in Melzer's reagent. There is a second collection at about 950 m., on a bare bank, Los Palos Grandes (Caracas), Edo. Miranda, 29.6.1958, *Dennis* 1076A.

Lepiota eriophora Peck in Bull. Torr. Bot. Club 30: 95 (1903).

Solitary; pileus 2 cm. diameter, convex, margin at first incurved, between Verona Brown and Snuff Brown, covered with small, erect, more or less

conical, slightly darker squamules; flesh thin, whitish; lamellae crowded, 2·5 mm. wide, free, white; stipe slightly tapering upwards, 40 × 3 mm., hollow, whitish above the ring, covered with loose, indistinctly squamulose, brown fibrils, concolorous with the pileus below; ring fibrillose, evanescent, white. Pileus-surface formed of clamped hyphae 4–5μ wide, with thin brown walls; similar hyphae 5–18μ wide clothe the stipe; squamules of pileus composed of globose cells, 20–40μ diameter, with thin, smooth, brown walls, interspersed with elliptical and short cylindrical elements; cheilocystidia vesicular, 15–25 × 4–7μ, easily overlooked; spores elliptic-cylindric, 3·5–4·5 × 2·5–2·75μ, deep red-brown in Melzer's reagent. Fig. 68.

About 50 m., on ground among dead leaves, Chichiriviche, Dto. Federal, 5.7.1958, *Dennis & Aristeguieta* 1144.

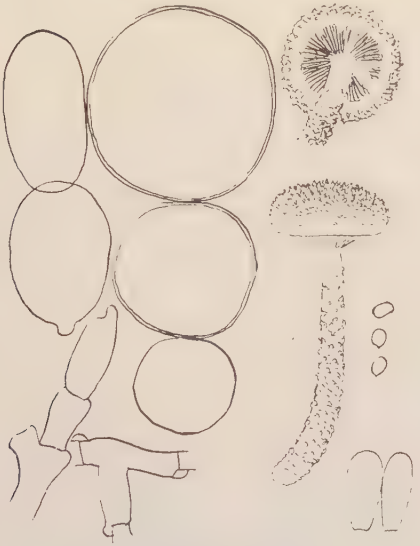


Fig. 68. *Lepiota eriophora*. Hyphae of pileus-surface and sphaerocysts, spores and cheilocystidia × 660.

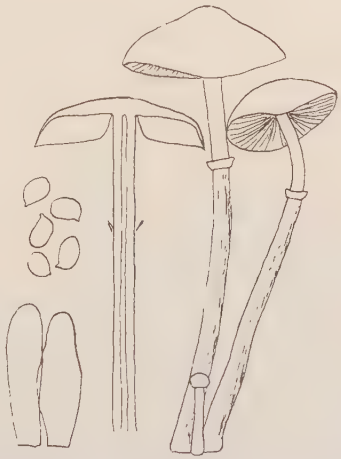


Fig. 69. *Lepiota griseo-rubescens*. Spores and cheilocystidia × 660.

The fungus resembles a small *L. acutesquamosa* (Wein.) Kummer, from which it is distinguished by its smaller spores. *L. eriophora* is united by many authors with the older *L. asperula* Atk. (Sept. 1901), which was figured by its author as having a white stipe. *L. aspratella* Murr. (1911) seems very similar but its lamellae have a distinct white edge with vesicular cheilocystidia 20–25 × 10–14μ. *L. scabrivelata* Murr. differs in its ochraceous pileus.

Lepiota griseo-rubescens *Dennis*, sp. nov.

Subcaespitosus; pileus campanulato-convexus, 2·5 cm. latus, glaber, fumosus; caro alba, fracta rubro-lateritia; lamellae roseae, postice rotundatae-liberae; stipes aequalis, fistulosus, albidus, sericellus; annulus inferus, membranaceus, albus. Sporae ellipticae 5–6 × 4μ. Fig. 69.

Hab. ad terram in silvis, El Junquito, Dto. Federal, 10.6.1958, *Dennis & Foldats* 1027 (typus).

Pileus Smoke Gray, not striate; flesh thin, white, turning reddish-purple when cut; lamellae pale pink. Pileus-surface composed of interwoven, prostrate, thin-walled hyphae, 5–8μ wide; cheilocystidia vesicular, ranging from slightly ventricose to slightly clavate, 25–28 × 6–9μ; spores broadly elliptical, without a germ-pore, pale pink when fresh, light yellow when dried, reddish-brown in Melzer's reagent.

Lepiota murino-capitata *Dennis*, sp. nov.

Pileus campanulato-convexus, 8 mm. latus, glaber, murinus, sericellus; lamellae confertae, liberae, albae; stipes aequalis, basi subincrassatus, albus, 1 mm. crassus; annulus membranaceus, mobilis, albus, margine floccis murinis fimbriatus. Sporae ovoideae, hyalinae, 5–6 × 3–3·5μ. Fig. 70.

Fig. 70 (above). *Lepiota murino-capitata.* Hyphae of pileus-surface, cheilocystidia and spore × 660.

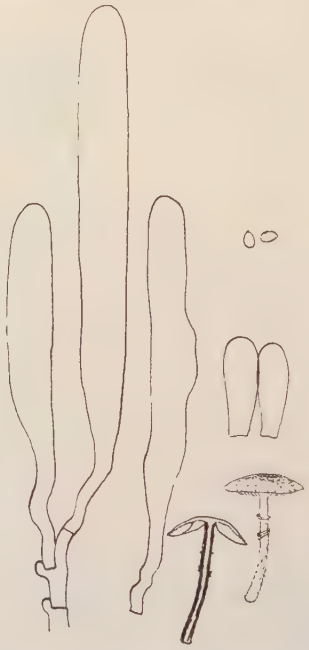


Fig. 71 (on right). *Lepiota parvispora.* Hairs of the squamules, spores and cheilocystidia × 660.

Hab. ad terram in silvis, Chichiriviche, Dto. Federal, 6.7.1958, *Dennis & Aristeguieta* 1147 (typus).

Solitary, pileus Dark Mouse Gray, margin not striate, surface covered with prostrate, branched, thin-walled hyphae, 4–7μ wide, without clamps, filled with grey sap; cheilocystidia vesicular, 20 × 6–8μ; basidia 4-spored, spores hyaline, red-brown in Melzer's reagent.

Lepiota parvispora *Dennis*, sp. nov.

Pileus convexus, 1 cm. latus, vinaceo-cervinus, squamulis obscurioribus; caro in pileo alba, in stipite fusca; lamellae confertae, ventricosae, liberae, ex albo luteolae; stipes aequalis, pileo concolor, fibrillosus, fistulosus; annulus inferus, duplex, floccoso-submembranaceus, albidus. Sporae ellipsoideae, 3–4 × 2μ. Fig. 71.

Hab. ad terram in hortis, Caracas, 19.6.1958, *Dennis* 1070 (typus).

Solitary; pileus Vinaceous Fawn, finely silky with innate minute Snuff Brown squamules and disc, margin not striate; lamellae yielding a light yellow solution in ammonia. Squamules composed of cylindric-clavate hairs up to 150 × 7–11μ, with thin, smooth, pinkish-brown walls, often with a basal clamp, occasionally becoming secondarily septate; cheilocystidia vesicular, hyaline, 20 × 7–8μ; spores red-brown in Melzer's reagent.

Differs from *L. microsperma* Locquin in the presence of clamps and from *L. helveola* Bres. and *L. subincarnata* Lange in the minute spores. *L. rubella* Bres., described with spores 4–5 × 2–2·5μ, apparently lacks the distinct annulus of *Dennis* 1070. *L. aspratella* Murr., with similar small spores, has the pileus covered with sphaerocysts. The closest affinity of *L. parvispora* seems to be with *L. erinana* Dennis, in which the squamule hairs are much shorter and distinctly clavate, there is no ring and the spores are a little larger, 4–5 × 2–2·75μ.

Lepiota erinana Dennis in Kew Bull. 7: 484 (1953).

About 50 m., in forest debris, Chichiriviche, Dto. Federal, 6.7.1958, *Dennis & Aristeguieta* 2533.

Lepiota pseudoignicolor *Dennis*, sp. nov

L. subgranulosa Murr. var. *majus* Dennis in Kew Bull. 7: 478 (1953).

Pileus campanulatus dein convexus, squamuloso-tomentosus, flammeo-fulvus; caro ochracea; lamellae confertae, postice rotundatae-liberae, luteolae, acie fimbriata, alba; stipes subaequalis, fistulosus, pallide ochraceis, flocculis fulvis punctatis; annulus inferus, tomentosus, evanidus, concolor. Sporae hyalinae, lateraliter apiculatae, 8–10 (–11) × 3·5–4μ. Fig. 72, p. 116.

Hab. ad stipites *Espeletiae*, Sierra de Santo Domingo, Edo. Mérida, 30.7.1958, *Dennis & Buza* 1752 (typus).

Solitary, pileus up to 3 cm. across, campanulate, then broadly convex with a low umbo, surface Sanford's Brown to Orange Rufus, breaking up into ill-defined squamules and exposing the Ochraceous Buff flesh, especially towards the margin; flesh Ochraceous Buff, deeper coloured in the stipe, thick at the disc, thin at the margin; lamellae 4 mm. wide, Straw Yellow, drying buff with a conspicuous white margin; stipe slightly tapering upward , 40 × 3·5 mm., ochraceous buff but largely concealed below the ring by the Orange Rufus squamules, base whitish. Pileus-surface composed of obtusely rounded, cylindrical, hairs up to 150 × 16μ, with thin, smooth, brown walls, arising from clamped hyphae; cheilocystidia variable, from ventricose, 20 × 6–8μ in the type to cylindric-clavate, 35 × 10μ, thin-walled, hyaline; spores spurred, red-brown in Melzer's reagent.

In addition to the type, from 3460 m., Laguna de Canoa, there are the following: 3440 m., in forest litter, Laguna Negra, 31.7.1958, *Dennis* 1752A; about 900 m., Botanic Garden, Caracas, 9.6.1958, *Dennis* 1016; Rio Chacaito, Caracas, Dto. Federal, 18.11.1949, *Dennis* 351 (typus of *L. subgranulosa* var. *majus*).

There is some variation in size and shape of cheilocystidia and spore size:

	1752	1752A	1016	351
Cheilocystidia	20 × 6-8	35 × 10	25-35 × 8-11	25-30 × 11μ
Spores	8-10 × 3.5-4	9-11 × 4-5	9-10(-11) × 3-4	8-11 × 3-4μ

The four collections agree so closely in macroscopic appearance and other characters that I feel it best to regard this as intraspecific variation but I have chosen one of the andean collections as typus of the species, thus leaving a varietal name available for the low country collections if it is thought practicable to separate them. Now that adequate material is available it is clear these fungi cannot be treated as a variety of *L. subgranulosa*, from which they are distinguished by the much longer hairs of the pileus and the more elliptical spores. The closest relationship seems to be with *L. ignicolor* Bres., from which they differ in the white, not fulvescent, edge to the lamellae, in the stipe-base being white, not fulvous-fibrillose and in the larger stature. From *L. castanea* Quél. they are separated by the brighter coloration of stipe and pileus.

FIG. 72 (on left). *Lepiota pseudoignicolor*. Hairs of the squamules, spores and cheilocystidia × 660.

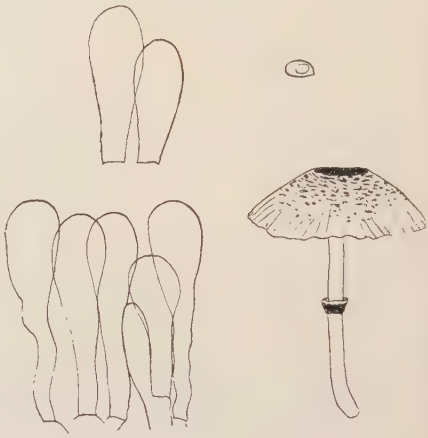


FIG. 73 (above). *Lepiota lilacea*. Cheilocystidia (above), spore and cells of the squamules × 660.

Lepiota lilacea Bres., Fungi Tridentini 2: 3 (1892).

Solitary; pileus convex, 2·5 cm. diameter, disc very dark purplish grey, even, remainder of surface dotted with minute, concolorous squamules on a white ground, margin closely striate; flesh thin, white; lamellae rather crowded, free, broad, white; stipe equal, 30 × 2 mm., vinaceous cinnamon,

hollow, smooth; ring persistent, membranous, fixed, white above and at the margin, dark purplish grey beneath. Squamules composed of a hymeniform layer of clavate, thin-walled cells, 35–50 × 8–10μ; cheilocystidia vesicular, hyaline, 25–30 × 8–10μ; spores ellipsoid, with a conspicuous guttule, 4–6 × 3–3·5μ. Fig. 73.

About 900 m., on bare soil, and chinks in rocks under trees, Botanic Garden, Caracas, Dto. Federal, 20.6.1958, *Dennis* 1082.

This is *L. micropholis sensu* Lange but not *L. micropholis* (Berk. & Br.) Sacc.

Lepiota micropholis (Berk. & Br.) Sacc., Syll. Fung. 5: 61 (1887).

Solitary; pileus campanulate, then expanded, 1–1·3 cm. diameter, disc fuscous, surrounded by approximately concentric rows of minute concolorous squamules on a white ground, margin striate; flesh thin, white;

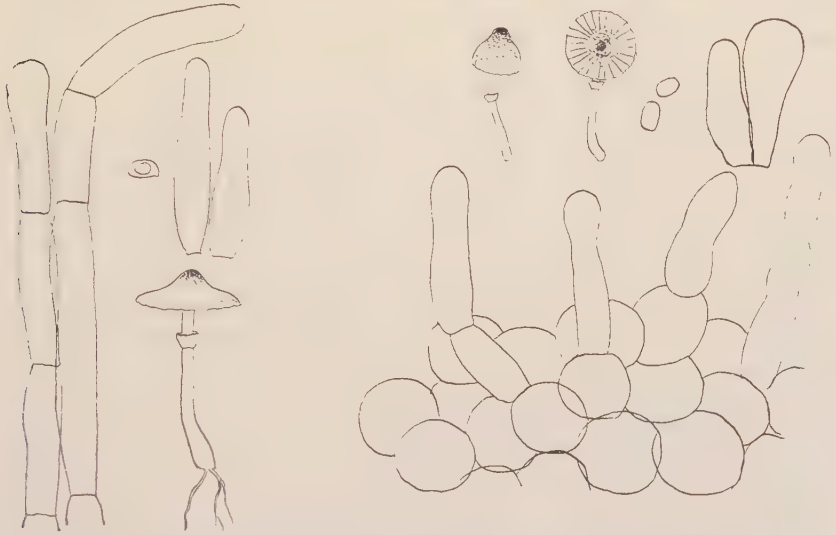


Fig. 74. Left: *Lepiota phaeosticta*. Squamule hyphae, spore and cheilocystidia × 660. Right: *Lepiota micropholis*. Squamule cells, spores and cheilocystidia × 660.

lamellae free, white; stipe equal or very slightly enlarged below, up to 25 × 1–1·5 mm., white, minutely downy with cylindric hyaline hairs; ring membranous, fixed, tinged with pale brown beneath. Squamule hyphae thin-walled, short-celled, 8–12μ wide, disarticulating to form a surface layer of globose, elliptical and pyriform cells 12–22μ across, interspersed with erect, clavate to moniliform thin-walled hairs up to 50 × 10μ, all cells light grey-brown under the microscope; cheilocystidia vesicular to clavate, 20–30 × 6–12μ, hyaline; spores elliptical, 4·5–6 × 3–3·5μ, red-brown in Melzer's reagent. Fig. 74 right.

900 m., in moss on bare soil, Botanic Garden, Caracas, Dto. Federal, 20.6.1958, *Dennis* 1080; bamboo plantation, St. Joseph, Trinidad, 20.10.1949, *Dennis* 209.

Thwaites 906, the type of *L. micropholis*, from Ceylon, has grey spherical cells up to 30μ diameter in the squamules and spores 4–5 × 3μ. I have not seen the clavate hairs on the pileus but the remaining specimen is not in very good condition and it is best to wait until fresh material from Ceylon has

been critically studied before assuming they are consistently absent from typical *L. micropholis*. In the circumstances I do not feel justified in describing the American fungus as a distinct species.

Dennis 1080 and 1082 grew on opposite sides of the same narrow path and are very similar in general appearance. They differ macroscopically in colour of stipe and ring, microscopically in the structure of the squamules. *L. subgrisea* Murr., which has sphaerocysts 12–27μ diameter and spores 6–7 × 3–3·5μ, seems very similar to *L. micropholis* but its pileus was said to have an avellaneous surface.

Lepiota phaeosticta Morgan in Journ. Mycology 12: 248 (1906).

Solitary; pileus campanulate, then expanded, up to 2·5 cm. diameter, umbo fuscous, surrounded by minute concolorous scales on a white ground, margin striate; flesh thin, white; lamellae 2–2·5 mm. broad, crowded, free, white; stipe up to 3·5 cm. × 1·5 mm., enlarged to 3–4 mm. at the bulbous base, white throughout, hollow, arising from a white mycelium; ring membranous, narrow, white. Disc covered with long, prostrate, septate, thin-walled hyphae, 6–10μ wide, without clamps, filled with grey-brown sap; cheilocystidia vesicular to ventricose, 30–40 × 7–8μ; spores ellipsoidal, 4·5–7 × 3–4μ, red-brown in Melzer's reagent. Fig. 74 left.

About 900 m., attached to rotten wood on the ground, Rio Chacaito, Caracas, Dto. Federal, 18.11.1949, *Dennis* 294B.

This is *L. micropholis* sensu Baker & Dale, Fungi of Trinidad. I have not seen the type of *L. phaeosticta* but the description seems to fit *Dennis* 294B remarkably well. *L. tepeitensis* Murr. is very similar but with slightly larger spores, 6–9 × 3·5–5μ. *L. nigropunctata* Dennis differs in the complete absence of a ring. The published figures of *L. montagnei* var. *congolensis* Beeli would pass for *L. phaeosticta* but according to Beeli his fungus has spores 7–9 × 4–5μ. *Agaricus montagnei* Kalch. 1881 was described as 'parce rufo-squamulosus'.

Lepiota pseudogranulosa (Berk. & Br.) Sacc., Syll. Fung. 5: 53 (1887).

1900 m., on ground in cloud-forest, El Junquito, Dto. Federal, 16.11.1949, *Dennis* 354, see Kew Bull. 7: 486.

COPRINACEAE

Coprinus brassicae Peck in Ann. Rept. New York State Mus. 43, 18 (1890)

2000 m., on dead culms and leaves of bamboo, in cloud-forest, El Avila, Dto. Federal, 4.7.1958, *Dennis* 1136. Fig. 75.

Coprinus brunneo-fibrillosus *Dennis*, sp. nov.

Pileus e cylindrico-campanulato expansus margineque demum revolutus, albidus, undique brunneo-floccosus, margine laceratus; stipes fistulosus, a basi attenuatus, fragillimus, albus, undique albo-lanatus, usque ad 6 cm. longus, apice 1·5–2, basi 3 mm. crassus; sporae ellipsoideae, fuscae, 9–11 × 6–7·5μ. Fig. 76.

Hab. 950 m., inter gramina, gregaria, Los Palos Grandes, Caracas, 29.6.1958, *Dennis* 1120 (typus); 11.7.1958, *Dennis* 1120A.

Squamule hyphae measure 10–25μ wide, with thin, brown, smooth walls. The species is obviously closely related to *C. lagopus* (Fr.) Fr., from which it differs in the brown hyphae of the squamules. From *C. extinctorius* Fr. sensu Romagnesi it seems distinguished by the absence of slender thick-walled hyphae from the squamules. The fructifications probably arose from rotting basal leaves of the lawn grasses as there was no indication that manure had been applied to the turf.

FIG. 75. *Coprinus brassicae*. Squamule hyphae, pleurocystidium and spores × 660.

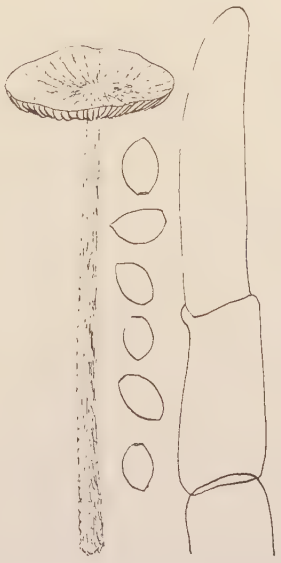


FIG. 76. *Coprinus brunneo-fibrillosus*. Spores and squamule hypha × 660.

Coprinus caracasensis *Dennis*, sp. nov.

Pileus membranaceus, ex cylindraceo-clavato conico campanulatus, mox margine laceratus revolutusque, 10 mm. altus, 5mm. latus, albus, granulosus; stipes aequalis, 55 × 1 mm., albus, undique albo-lanatus; sporae ovoideae, apice truncatae, (7)–8–9 × 6·5–7 × 5·5–6μ, atrae, opacae; pleurocystidia fusoideo-vesiculosa, 45–60 × 16–20μ. Fig. 77, p. 120.

Hab. 900 m., inter folia dejecta, putrescentia, in hortis, Caracas, 20.6.1958, *Dennis* 1078 (typus).

The sphaerocysts of the pileus are thin-walled, hyaline, 15–44μ diameter, ornamented with scattered granules soluble in water. The general aspect of the fruit-body is that of a very slender *C. niveus* (Pers. ex Fr.) Fr.

Coprinus maculatus *Dennis*, sp. nov.

Subcaespitosus; pileus submembranaceus, ex ovato campanulatus demumque subexpansus, argillaceus, squamis villosis obscurioribus obsitus, 2 cm. altus; lamellae dense confertae, fere lineares, e concoloris umbrinae, demum nigricantes, tardius diffluentes; stipes cavus, cylindraceus, sursum attenuatus, albidus, 40 × 4–5 mm.; sporae ellipsoideae, leves, brunneae,

opacae, 6–7·5 × 4–4·75μ; pleurocystidia cylindraceo-vesiculosa, 70 × 20μ. Fig. 78.

Hab. 900 m., ad truncos in hortis, Caracas, Dto. Federal, 18.8.1958, *Dennis* 1819 (typus).

The small dark squamules of the pileus are composed of interwoven hyphae, 2–5·5μ wide, with thin brown encrusted walls.

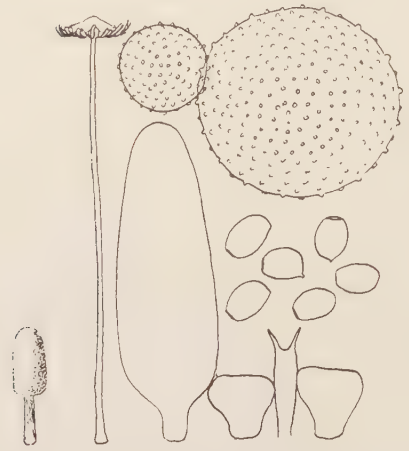


Fig. 77. *Coprinus caracasensis*. Sphaerocysts, spores and portion of hymenium × 660.

Fig. 78. *Coprinus maculatus*. Squamule hyphae, spores and pleurocystidium × 660.

Coprinus friesii Quél., Champ. Jura et Vosges: 129 (1872).

About 950 m., on dead grass leaves in lawn, Los Palos Grandes (Caracas), Edo. Miranda, 11.7.1958, *Dennis* 1495. Fig. 79.

Spores brown, (9)–10–13 × 8–9 × 7·5μ, coralloid hyphae of the pileus squamules hyaline, 2·5–3μ wide. This and *C. brassicae* belong to a species complex still insufficiently known and it is possible monographers may eventually differentiate the Venezuelan collections from the European species to which they are here referred.

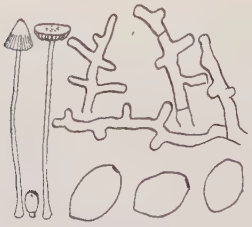


Fig. 79 (above). *Coprinus friesii*. Squamule hyphae and spores × 660.

Fig. 80 (on right). *Coprinus comatoïdes*. Spores × 660.

Coprinus comatoïdes *Dennis*, sp. nov.

Pileus e cylindraceo campanulatus demumque expansus, initio sericellus sed mox in squamas latas, sparsas, adpressas laceratus, apice tantum levis, cervinus, 4 cm. altus 2·5 cm. latus; stipes aequalis, albus, 55 × 6 mm., annulo membranaceo exornatus; sporae subglobosae, apice truncatae, 6–8 × 5–7μ. Fig. 80.

Hab. 900 m., ad terram, in hortis, Caracas, 14.7.1958, *Dennis* 1653 (typus); 1653A.

The spores bear a marked resemblance to those of *C. lagopides* Karst. but the coloured squamules and basal, movable, ring of *Dennis* 1653 prevent confusion between the two species. The squamule hyphae are 6–16μ wide, with thin, brown, nonencrusted walls. Sections of young gills showed no cylindrical pleurocystidia.

Coprinus comatus (Mull. ex Fr.) S. F. Gray, Nat. Arrang. Brit. Pl. 1: 633 (1821).

About 900 m., in a garden, Caracas, Dto. Federal, 25.6.1958, *Dennis & Aristeguieta* 2535.

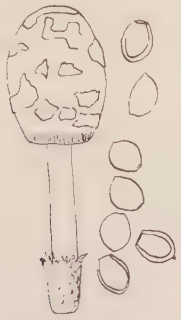


Fig. 81. *Coprinus cubensis*. Spores × 660.

Fig. 82. *Coprinus patouillardii*. Carpophores natural size and enlarged, spores and sphaerocysts × 660.

Coprinus cubensis Berk. & Curt. in Journ. Linn. Soc. Bot. 10: 293 (1869).

Pileus ovoid, 1·8 × 1·4 cm., before expansion white, with white floccose patches of the veil, then blackening with white squamules as in *C. picaceus* (Bull. ex Fr.) S. F. Gray, stipe equal, 3 mm. wide, white, with a fibrous sheath left by the veil at the base. Hyphae of the squamules hyaline, 4–5μ wide; spores dark brown, (7)–8–9 × 6–6·5–(7) × 5·5–6μ, with a broad germ-pore. Cystidia not seen as the pileus deliquesced too rapidly. Fig. 81.

About 50 m., solitary on a rotting log in coffee plantation, Chichiriviche, Dto. Federal, 6.7.1958, *Dennis & Aristeguieta* 1143.

This collection closely resembles *C. lagopides* Karst., of which Orton (1957) believes *C. jonesii* Peck to be a synonym. It differs in substrate and in the slender hyphae of the veil, since Orton stresses that *C. lagopides* has veil hyphae 12–40μ wide. It agrees tolerably with the brief diagnosis of *C. cubensis* and with what remains of the carpophore of *Wright* 79 at Kew. The accompanying spore-print under that number, however, came from another species, with spores rather like those of *C. truncorum*, 7–8 × 4–4·5μ.

Coprinus domesticus (Bolt. ex Fr.) S. F. Gray, Nat. Arrang. Brit. Pl. 1: 635 (1821) emend. Metrod in Rev. Mycol., N.S. 5: 79 (1940).

900 m., on dead wood, Botanic Garden, Caracas, Dto. Federal, 1.7.1958, *Dennis* 1127; 3550 m., inside dead hollow stem of *Espeletia* sp., Laguna Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 23.7.1958, *Dennis & Buza* 1708.

Veil containing brown, septate, hyphae, 7–10μ wide and globose cells 15–30μ diameter; pleurocystidia vesicular, 55 × 36μ, cheilocystidia similar, 45 × 28μ, spores slightly reniform, brown, with a broad germ-pore, 6–7·5 × 3–4·5μ; brown *Ozonium* associated.

Coprinus patouillardii Quél. apud Pat., Tab. Analyt. fung. 3: 107 (1884).

About 2000 m., on donkey dung, El Avila, Dto. Federal, 13.6.1958, *Dennis* 1042. Fig. 82, p. 121.

Coprinus plicatilis (Curt. ex Fr.) Fr., Epicrisis Syst. Myc.: 252 (1838)

c. 800 m., occurring singly on bare soil at forest margin, Guatopo, Edo. Miranda, 26.6.1958, *Dennis* 1110; amongst grass on lawn, St. Augustine, Trinidad, 21.9.1949, *Dennis & Baker* 1; on ground in cacao plantation, Aripo, Trinidad, 23.10.1949, s.n.

All the above have the characteristic spores (10)–11–13 × 8–11 × 6–7μ.

var. *microsporus* Kühner in Bull. Soc. mycol. France 50: 57 (1934).

About 900 m., on ground in dry forest, Rio Chacaito, Caracas, 18.11.1949, *Dennis* 215 A. Spores 8–10 × 7–8·5 × 4·5–5μ.

Coprinus pseudomicaceus *Dennis*, sp. nov.

Caespitosus; pileus membranaceus, ex ovato campanulato-subexpansus, longe striato-sulcatus margineque fimbriato-lacerus, primitus pruina micacea alba detersibili tectus, ex ochraceo-ochroleuco griseo-alutaceus, 1 cm. latus; stipes initio brevis dein elongatus, tereto-cylindraceus, e basi attenuatus, fragillimus, levis, albus, 25 × 1–2 mm.; sporae ellipsoideae, 6–7 × 4·5–5 × 3·5–4·25μ, apice truncatae, fuscae; basidia tetraspora. Fig. 83.

Hab. 1200 m., ad truncos, Cortada del Guayabo, Edo. Miranda, 9.7.1958, *Dennis* 1152 (typus).

The fungus resembles a small *C. micaceus* (Bull. ex Fr.) Fr., grows in dense swarms on rotting logs and is quickly putrescent. Squamule cells are globose, subhyaline, smooth, thin-walled, 20–40 × 20–36μ, the underlying pileus-surface composed of subglobose cells, 13–16μ diameter, with thin brown walls. There are no pleurocystidia on the young gills.

Coprinus subtigrinellus *Dennis*, sp. nov.

Pileus hemisphericus, fuscus, dein campanulatus, membranaceus, albus, squamis brunneis minutis obtectus, 5 mm. altus, 4 mm. latus, demum

revolutus; stipes aequalis, 10 × 0·5 mm., albus, levis, basi albo-hirsutus; sporae subglobosae, fuscae, 6–7 × 4·5–6μ, apice truncatae. Fig. 84.

Hab. 900 m., ad folia dejecta putrescentia *Arundinis donacis*, in hortis, Caracas, 30.6.1958, *Dennis* 1124 (typus).

Allied to *C. brassicae* Peck and *C. saichiae* Reid but distinguished from both by its dark coloured veil, composed of coralloid hyphae 3 -7μ wide, with thin brown walls, without clamps. There are no pleurocystidia. Other species akin to *C. friesii* Quél. differ in their larger spores.

Fig. 83 (above). *Coprinus pseudomicaceus*. Spores × 660.

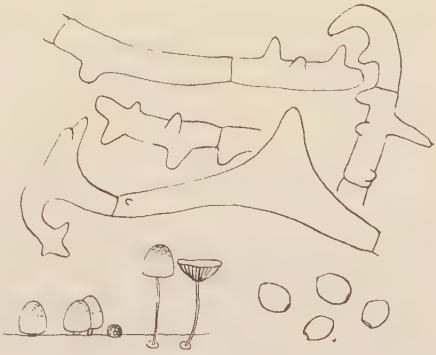


Fig. 84 (on right). *Coprinus subtigrinellus*. Squamule hyphae and spores × 660.

Coprinus truncorum (Schaeff.) Fr., Epicrisis Syst. Myc.: 248 (1838).

3560 m., on rotting *Espeletia* sp., first corrie south of Laguna Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 24.7.1958, *Dennis & Buza* 1722; 3440 m., on dead log, Laguna Negra, 27.7.1958, *Dennis* 1722A.

A further collection, *Dennis* 1722B, from Laguna Negra, has slightly broader, greyer, spores, 7·5–9 × 4·4–6μ, with the stipe pruinose throughout, and may represent *C. micaceus* in the restricted sense of Romagnesi.

Additional species occurring in Trinidad include:

Coprinus ephemerus (Bull. ex Fr.) Fr., Epicrisis Syst. Myc.: 252 (1838) forma.

On old cow dung, St. Augustine, 21.10.1949, *Dennis* 213.

Basidia 4-spored, spores brown, 10–14 × 5·5–7μ, pilocystidia as in *C. ephemerus sensu* M. Lange but pleurocystidia lacking.

Coprinus jamaicensis Murr. in Mycologia 10: 84 (1918)

On decorticated wood, 10th mile on the Arima–Blanchisseuse road, northern range, 25.9.1949, *Dennis* 43.

Coprinus lagopus (Fr.) Fr., Epicrisis Syst. Myc.: 250 (1838).

Solitary on garden soil, St. Augustine, 8.10.1949, *Dennis* 146.

Coprinus macrorhizus (Pers. ex Fr.) Rea, Brit. Basidiomycetae: 503 (1922).

On dung, St. Augustine, Sept. 1949, *Baker & Dennis* 32.

Coprinus mexicanus Murr. in Mycologia 10: 84 (1918).

In swarms on decorticated log, L'Orange, Aripo valley, 13.10.1949, *Dennis* 170; River Estate, Diego Martin, *Dennis* 170A, also along the Tucuche trail and at the 10th mile on the Arima–Blanchisseuse road, all localities in the northern range, as well as at Non Pareil, Sangre Grande.

Anellaria semiovata (Sow. ex Fr.) Pearson & Dennis in Trans. Brit. myc. Soc. 31: 185 (1948).

3550 m., on horse dung, Laguna Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 23.7.1958, *Dennis & Buza* 1719.

Pilei measure 2·5–4 cm. diameter, with stipes 6–7 cm., i.e. a short-stalked state like that recorded by Somerville-Hastings from 1800–2400 m. in the Alps (Trans. Brit. mycol. Soc. 9: 34–35, (1923).

Panaeolus antillarum (*Fr.*) *Dennis*, comb. nov.

Agaricus (*Coprinarius*) *antillarum* Fr., Elenchus fungorum 1: 42 (1828).
Agaricus sepulchralis Berk. in Hooker, London Journ. Bot. 1: 452 (1842).
Panaeolus sepulchralis (Berk.) Sacc., Syll. Fung. 5: 1119 (1887).
Panaeolus solidipes Peck Ann. Rept. New York State Mus. 23: 101 (1872).

On cow dung, St. Augustine, Trinidad, 8.10.1949, *Dennis* 149; 21.10. 1949, *Dennis* 149A.

This is certainly *Ag.* (*Psilocybe*) *antillarum* var. *praelonga* Fr. in Nov. Symb. Myc. 1851, as is shown by Oersted's drawing now at Copenhagen and already suggested by Murrill. It seems highly probable that Benzon's type, now lost, also from St. Croix, was the same species and provides the oldest epithet for this very common tropical species. Singer (1952) has indicated that the present fungus is common throughout the warm and temperate parts of South America whereas *Anellaria semiovata* occurs only in the Andes and in high latitudes, as in Tierra del Fuego.

Panaeolus (*Copelandia*) *cyanescens* (Berk. & Br.) Sacc., Syll. Fung. 5 1123 (1887).

On garden soil, St. Augustine, 17/20.5.1947, *R. E. D. Baker* 1434, 1437; on donkey dung, St. Joseph, Trinidad, 18.10.1949, *Dennis* 185; about 50 m., on dung, Chichiriviche, Dto. Federal, Venezuela, 6.7.1958, *Dennis & Aristeguieta* 2536. For description see Singer in Lilloa 30: 124 (1960).

Panaeolus sphinctrinus (Fr.) Quél., Champ. Jura et Vosges: 121 (1872).

3440 m, on cow dung. Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1751; 1.8.1958, *Dennis* 1778.

Panaeolus variabilis Overholts in Ann. Missouri Bot. Gard. 3: 197 (1916).

Among grass under Guava tree, St. Augustine, 4.10.1949, *Dennis* 122; on donkey dung, St. Joseph, Trinidad, 18.10.1949, *Dennis* 122A.

Spores 10–12 × 7–9 × 6μ, smaller than in *P. campanulatus* (Bull. ex Fr.) Quél. and its allies.

Psathyrella (*Lachrymaria*) *velutina* (Pers. ex Fr.) Sing. in Lilloa 22:466 (1951).

About 2000 m., on sandy soil with dead roots beside road along the crest of El Avila, Dto. Federal, 13.6.1958, *Dennis* 1344.

Psathyrella (*Pseudocoprinus*) *disseminatus* (Pers. ex Fr.) Quél., Champ. Jura et Vosges: 123 (1872).

1800 m., on a log, El Junquito, 16.11.1949, *Dennis* V6; 2000 m., caespitose on dead roots and adjacent sandy soil, ridge of El Avila, Dto. Federal, 13.6.1958, *Dennis* 1043; 1044.

The remaining collections of *Psathyrella* fall into two series, one from the warmer forests, without pleurocystidia, and the other from the cold woodlands on the Andes, with pleurocystidia.

A. Species of Psathyrella without pleurocystidia

Psathyrella acutisquamosa *Dennis*, sp. nov.

Pileus submembranaceus, convexus, stramineus, verrucis centro pyramidalibus albus obtectus, margine striatus, 9 mm. latus; lamellae confertae, fusco-purpureae, acie albo-fimbriatae; stipes aequalis, 15 mm. longus, 1 mm. crassus, stramineus, nitidus; velum nullum; sporae ovoideae, purpureae, 5–7 × 4–5μ; cheilocystidia cylindraceo-ventricosa 25–35 × 11–16μ. Fig. 85.

Hab. ad ligna mucida in silvis frondosis, c. 50 m., Chichiriviche, Dto. Federal, 6.7.1958, *Dennis & Aristeguieta* 1148 (typus).

Fig. 85. *Psathyrella acutisquamosa*. Spores and cheilocystidia × 660.

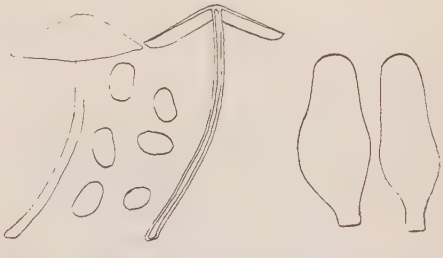


Fig. 86. *Psathyrella albocapitata*. Spores and cheilocystidia × 660.

Psathyrella albocapitata *Dennis*, sp. nov.

Pileus membranaceus, subfragilis, e conico-campanulatus subexpansus, glaber, levis, velo omnino destitutus, margine rivuloso substriatus, albus, 2 cm. latus; caro alba; lamellae confertae, subventricosae, postice adnatae, ex albido cinereis purpureo-brunneae, 2 mm. latae, acie albo-pruinatae; stipes cylindraceo-flexuosus, aequalis, fistulosus, 35 × 1·5 mm. glaber, albus, fragilis; sporae fusco-umbrinae, ellipsoideo-ovoideae, 6–8 (–9) × 4–5 (–5·5)μ; basidia clavata, 15 × 8μ, tetraspora; cheilocystidia ventricosa, 22–35 × 11–14μ. Fig. 86.

Hab. 2240 m., ad truncos, Rancho Grande, Edo. Aragua, 19.11.1949, *Dennis* 346 (typus).

There seem to be no pleurocystidia and the pileus-surface appears atomate under a lens from the vesicular surface cells. The species differs from *P. glaucescens* not only in colour and stature but in its larger, darker, different shaped spores with much smaller germ-pore. In general appearance it recalls *Psilocybe cernua* sensu Bresadola, which has larger spores. *Psathyrella cernua* (Vahl ex Fr.) Moser in the sense of Kühner and Romagnesi is a fungus of different stature with encrusted cystidia. *Psathyra ocreata* (Berk. & Br.) Sacc., of Ceylon, is superficially similar but I have been unable to examine it microscopically; according to Berkeley it had spores 6·5μ long.

What seems to be an almost completely sterile state of *P. albocapitata* occurred on rotten wood in the Botanic Garden, Caracas, 18.8.1958, *Dennis* 1818. In this the few spores produced were larger, 8–11 × 5–6μ and a few vesicular pleurocystidia 30 × 13–18μ occurred in the vicinity of the gill-edge only.

Psathyrella araguana *Dennis*, sp. nov.

Pileus membranaceus, campanulato-expansus, spadiceo-umbrinus, margine alutaceo-brunneo obsolete rivuloso-striato, glaber, 2–3 cm. latus; caro in pileo pallida, ceterum albida; lamellae confertae, ventricosae, postice adnatae, fusco-purpureae, 2 mm. latae; stipes aequalis, subflexuosus, fistulosus, albus, nitidus; velo omnino destitutus; sporae ellipticae, fusco-umbrinae, 5–7 (–7·5) × 4–5μ; cheilocystidia ventricosa 30–40 × 9–11μ. Fig. 87.

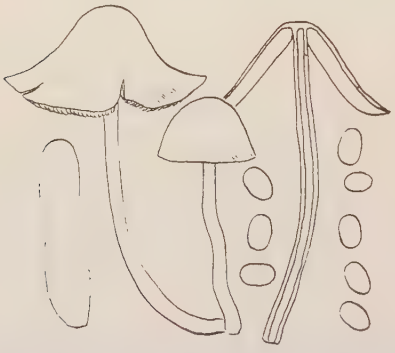


Fig. 87. *Psathyrella araguana*. Cheilocystidium and spores × 660.

Hab. 2240 m., ad truncos, Rancho Grande, Edo. Aragua, 19.11.1949, *Dennis* V47 (typus).

This seems distinguished from the preceding by its colour and slightly smaller spores but the two are certainly closely related. *Psathyra efflorescens* (Berk. & Br.) Sacc. of Ceylon, has a similar stature and spores but according to Petch its cheilocystidia are globose to subglobose, 14–18 × 10–12μ. Petch is, however, quite wrong in citing as a synonym *P. lucipeta* (Berk. & Br.) Sacc., the type of which has very pale ovoid spores 9 × 5·5μ.

Psathyrella avilana *Dennis*, sp. nov.

Pileus membranaceus, e hemisphaerico convexo-applanatus, glaber, striatulus, hygrophanus, spadiceus, disco haud prominente fulvescens, 2–3 cm. latus; caro in pileo dilute spadicea, ceterum albida, fragilis; lamellae subconfertae, anguste ventricosae, postice adnatae, purpureo-brunneae,

acie albida pruinata; stipes cylindraceo-elongatus, basi saepe connato-caespitosa, aequalis, glaber, fistulosus, albus, 5 cm. longus, 2 mm. crassus; sporae ellipsoideae, apice subtruncatae, pellucido-brunneae, leves, 6–6·5 × 3·5–4μ; cheilocystidia ventricosa, 25–40 × 12–15μ. Fig. 88.

Hab. 2000 m., caespitosa ad terram detriticam in silvis, El Avila, Dto. Federal, 17.6.1958, *Dennis* 1065 (typus).

This has the air of a slender *P. hydrophila* (Bull. ex Mérat) R. Maire, from which it differs in the apparent absence of pleurocystidia and almost complete absence of a veil. Very young carpophores have a few marginal fibrils but all expanded pilei are naked.

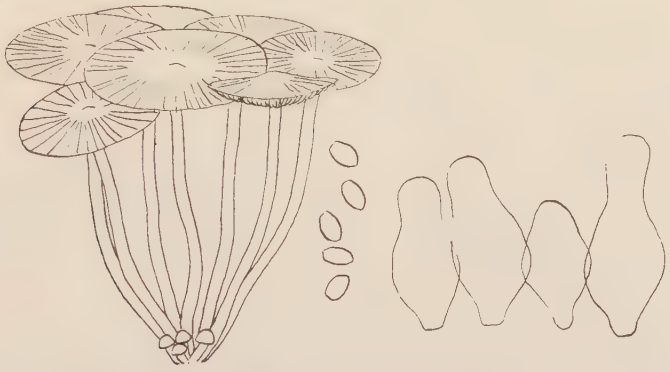


Fig. 88. *Psathyrella avilana*. Spores and cheilocystidia × 660.

Psathyrella candolleana (Fr.) R. Maire in Mém. Soc. Sci. Nat. Maroc 45: 112 (1938).

About 950 m., in small clusters on a lawn, Los Palos Grandes (Caracas), Edo. Miranda, 29.6.1958, *Dennis* 1121; in leaf-litter under small trees, Botanic Garden, Caracas, Dto. Federal, 30.6.1958, *Dennis* 1121A.

? **Psathyrella euthygramma** (*Berk. & Curt.*) *Dennis*, comb. nov.

Agaricus euthugrammus Berk. & Curt. in Journ. Linn. Soc., Bot. 10: 290 (1869). *Naucoria euthygramma* (Berk. & Curt.) Sacc., Syll. fung. 5: 835 (1887).

Pileus 8–14 mm. diameter, hemispherical, then convex or expanded, light grey-brown, striate to the disc, at first with a fibrillose cream coloured veil and the margin appendiculate, finally naked; flesh thin, hygrophanous, concolorous; lamellae rather crowded, ventricose, 1·5 mm. wide, adnexed, grey-brown; stipe equal, 10–25 × 1 mm., shining white, sometimes with an annular zone from the veil, base strigose; spores ellipsoidal, brown, 5·5–7 × 3–3·5μ; cheilocystidia utriform, 20–40 × 14–17μ, interspersed with smaller vesicular cells; cells of the pileus surface 30–35μ diameter.

2240 m., subcaespitose on dead leaves in cloud-forest, Rancho Grande, Edo. Aragua, 19.11.1949, *Dennis* 345. The type was on dead wood in Cuba and microscopic data other than spores are no longer recoverable from it but it is clearly a *Psathyrella*.

Psathyrella glaucescens *Dennis*, sp. nov.

Pileus membranaceus, e hemisphaerico convexo-expansus, glaber, hygrophanus, pallide olivaceus ("Olive Buff', 'Dark Olive Buff', 'Light Yellowish Olive', Ridgway), 2–3·5 cm. latus; velum album, fibrillosum, evanidum; caro in pileo olivacea, ceterum albida, fragilis; lamellae subconfertae, postice rotundato-adnatae, 3 mm. latae, e carneo-purpureis fuscesentes, acie albo-pruinatae; stipes fistulosus, sub-aequalis, subflexuosus, albus, sericeo-fibrillosus, ad 6 cm. longus, 3–4 mm. crassus; sporae ovatae, apice truncatae, pallide purpureo-brunneae, 5–6 × 3–4μ; cheilocystidia ampullaceo-stipitatae, vel ventricosa, 25–42 × 13–17μ. Fig. 89.

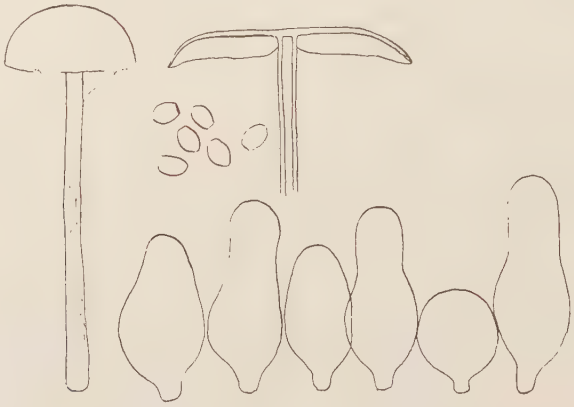


Fig. 89. *Psathyrella glaucescens*. Spores and cheilocystidia × 660.

Hab. 2000 m., ad ligna mucida, frustula putrida &c. in silvis, El Avila, Dto. Federal, 17.6.1958, *Dennis* 1064 (typus); 2240 m., Rancho Grande, Edo. Aragua, 19.11.1949, *Dennis* 338.

As with most hygrophanous *Psathyrellas* there is considerable variation in the colour of this distinctive species. Young specimens vary from olive-buff at the margin to light yellowish olive or greyish brown at the disc but they may become grey-brown throughout with age. The margin is only faintly striate and there seem to be no pleurocystidia.

Fig. 90. *Psathyrella myceniformis*. Cheilocystidia, spores, basidium and paraphyse × 660.

Psathyrella myceniformis *Dennis*, sp. nov.

Pileus submembranaceus, ovato-conicus, papillatus ex integro, papilla tantum excepta, striatus, initio ob velum albis fibrillosis conspersus, dein nudus, 4–6 mm. latus, 10 mm. altus, margine cortina appendiculata fugaci

in prima juventute ornatus; lamellae confertae fusco-nigricantes, acie albo-fimbriatae; stipes aequalis, subflexuosus, albus, sericeo-fibrillosus, 3 cm. longus, 2 mm. crassus; sporae ovato-oblongae, apice truncatae, fuscae, 13–14 × 6–6·5μ; basidia clavata, pedicellata, tetraspora, 28–33 × 12μ; cheilocystidia cylindraceo-ventricosa, 30–40 × 11–17μ. Fig. 90.

Hab. 2000 m., ad culmos *Bambuseae* cujusdam dejectos putrescentes in silvis, El Avila, Dto. Federal, 4.7.1958, *Dennis* 1137 (typus).

B. Species of Psathyrella with pleurocystidia

Psathyrella aristeguietana *Dennis*, sp. nov.

Pileus carnosus, ex hemisphaerico explanato-convexus, subumbonatus, levis, subviscidus, hygrophanus, ochraceo-fulvus, 4·5 cm. latus, usque ad medium pellucido-striatus, cortina alba, fimbriata admodum fugax; caro in pileo dilute spadicea vel ochraceo-fulva, ceterum albida; lamellae laxe confertae, postice rotundato-adnexae, demum umbrino-violaceae, acie pallidiores, 6 mm. latae; stipes fistulosus, cylindraceus, saepe curvatus vel sinuosus, ad basim dilute spadicea, ceterum albida, 5 cm. longus, 4·5–5 mm. crassus, basi 9 mm. crassus; velum membranaceum, annulare, evanidum; sporae oblongo-ovatae, truncatae, fuscae, 9·5–10·5 × 5–6μ; pleurocystidia et cheilocystidia fusoideo-ventricosa, 60–75 × 12–16μ. Fig. 91.

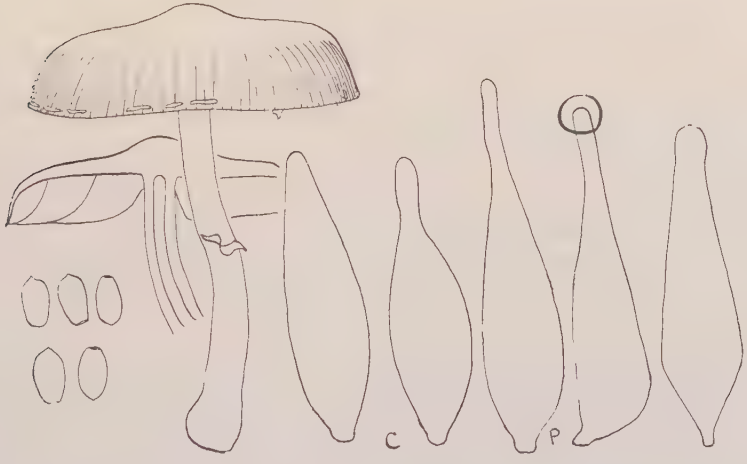


Fig. 91. *Psathyrella aristeguietana.* Spores, cheilocystidia (C) and pleurocystidia (P) × 660.

Hab. solitarius ad terram muscosam ad basim truncorum, 3440 m., Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1739 (typus).

Differs from *P. olympiana* A. H. Sm. in the thin-walled cystidia and from *P. spadicea* (Schaeff. ex Fr.) Sing. in its membranous though fugacious ring, which might lead the species to be sought in *Stropharia*. The pileus surface is, however, composed of globose cells about 40μ diameter.

Psathyrella bernardiana *Dennis*, sp. nov.

Pileus submembranaceus, conico-campanulatus, obtusus, striatulus, hygrophanus, glaber, avellaneus, 2·5 cm. latus; caro dilute olivacea, fragilis; lamellae confertae, 4 mm. latae, postice adnatae, cinereo-nigricantes, acie albida pruinata; stipes cylindraceus, fistulosus, 4·5 cm. longus, 3–4 mm. crassus, luride flavus, nudus; sporae ellipsoideo-ovoideae, umbrinae, 9–10 × 4·5–5μ; pleurocystidia fusoideo-acuminata vel fusoideo-ventricosa, pallide vinaceo-tincta, 45–55 × 11–17μ; cellulae acie lamellarum obovato-vesiculosae. Fig. 92.

Hab. ad fragmenta lignea, c. 3560 m., Sierra de Santo Domingo, Edo. Mérida, 23.7.1958, *Dennis & Buza* 1714 (typus).

In shape and colouring the cystidia resemble those of *P. rubicola* A. H. Sm. but the spores are larger and there is no conspicuous white veil.

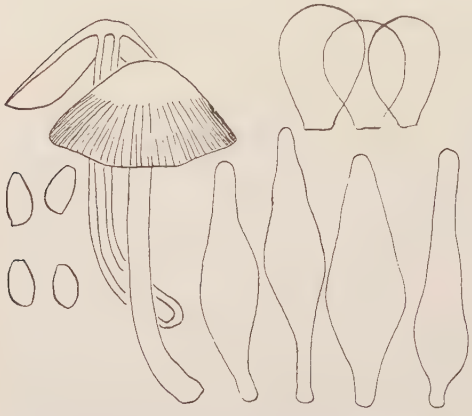


Fig. 92 (above). *Psathyrella bernardiana*. Spores, cheilocystidia (above) and pleurocystidia × 660.

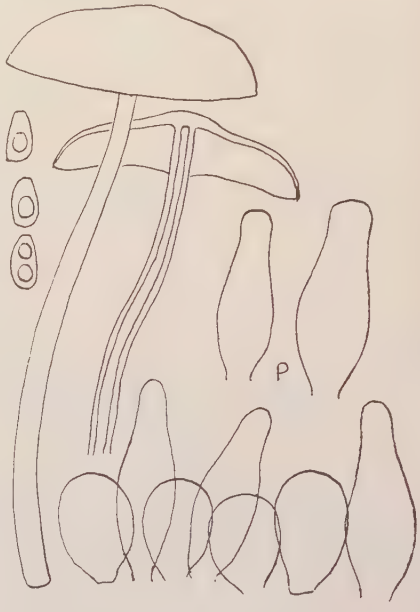


Fig. 93 (on right). *Psathyrella viloriana*. Spores, pleurocystidia (P) and cheilocystidia × 660.

Psathyrella subnuda (Karst.) A. H. Sm. in Contrib. Univ. Mich. Herb. 5: 61 (1941).

3440 m., scattered singly or in pairs on bare soil in forest, east shore of Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 1.8.1958, *Dennis* 1783.

The collection agrees remarkably well with Lange's Fig. 152C and has the characteristic dark brown spores (7)–8–9·5 × (4)–5–6μ, darker and shorter than those of *P. viloriana* and with a broader germ-pore.

Psathyrella viloriana *Dennis*, sp. nov.

Pileus submembranaceus, convexo-expansus, subumbonatus, glaber, fragilis, margine striatulus, hygrophanus, brunneo-griseus, 3 cm. latus; caro aquosa, inodora, in pileo concolor, in stipite alba; lamellae subconfertae, latiusculae, postice adnatae, leviter curvato subdecurrentes, fusco-pur-

pureae, acie albida pruinata; stipes fistulosus, elongatus, subaequalis, 7·5 cm. longus, 3–4 mm. crassus, albus, nitidus, apice subfurfuraceus; vellum nullum; sporae obovato-elongatae, leves, purpureo-fuscae, 8·5–10·5 × 5–5·5μ; pleurocystidia cylindraceo-ventricosa, 30–35 × 9–14μ; cheilocystidia 35–40 × 9–13μ, cellulae aciei lamellarum obovato-vesiculosae, 20–30 × 14–20μ. Fig. 93.

Hab. ad terram silvaticam, 3440 m., Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1740 (typus).

Macroscopically the fungus closely resembles *P. obtusata* (Fr.) A. H. Sm. and to some extent *P. spadiceo-grisea* (Fr.) R. Maire but differs from both in its larger spores. It apparently lacks the veil of *P. fusca* (Lange) Moser and *P. similis* (Parker) A. H. Sm. The name proposed is in honour of Dr. R. Viloria Diaz, dean of the Faculty of Forestry, Universidad de Los Andes, Mérida, to whose generous cooperation I owe the facilities for collecting at the small but exceptionally rich forest of Laguna Negra.

BOLBITIACEAE

Bolbitius mexicanus (Murr.) Murr. in Mycologia 4: 332 (1912).

900 m., Rio Chacaito, Caracas, 18.11.1949, *Dennis* 394.

See description in Bul. Soc. mycol. France 69: 193–4 (1953).

Conocybe pubescens (Gillet) Kühner, Encycl. mycol. 7: 85 (1935).

Solitary; pileus hemispherical, 2 cm. diameter, light yellowish brown, closely pellucidly striate half way to the disc, smooth, dry; flesh thin, watery grey, hygrophanous; lamellae crowded, ascending, adnate, about 4 mm. wide, ochraceous-brown; stipe cylindrical, about 45 × 2–2·5 mm., concolorous, hollow, whitish-pruinose above. Pileus-surface composed of globose cells 20μ diameter; basidia 4-spored, 25 × 15μ; spores red-brown, smooth, elliptical with a broad germ-pore, 13–17 × 8–10μ; cheilocystidia abundant, hyaline, ninepin-shaped, base 6–7μ, apex 3–3·5μ; hairs of the stipe evanescent and not recovered in the dried material.

About 3560 m., on dung on moors between Laguna Mucubaji and Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1735.

Conocybe siennophylla (Berk. & Br.) Sing. in Sydowia 9: 402 (1955).

Scattered; pileus campanulate, about 1 cm. diameter, yellowish-brown, pellucidly striate halfway to the disc, smooth, dry; flesh thin, watery, hygrophanous; lamellae crowded, ascending, adnate, 2 mm. wide, ochraceous-brown; stipe cylindrical with a slightly swollen base, 45 × 1 mm., concolorous, with neither ring nor cortina but minutely downy above. Pileus-surface formed of globose cells 15–30μ diameter; basidia 4-spored, 18–21 × 9μ; spores elliptical, with a broad germ-pore, smooth, red-brown, 9·5–11 × 5·5–6·5μ; cheilocystidia ninepin-shaped, base 6–9μ, apex 4–5μ; hairs of the stipe cylindrical thin-walled, 30–50 × 6–7μ. Fig. 94.

About 3560 m., in wet moss, paramo of Mucubaji valley, Sierra de Santo Domingo, Edo. Mérida, 25.7.1958, *Dennis & Buza* 1729; 3440 m., on soil in forest, Laguna Negra, 26.7.1958, *Dennis* 1799.

I owe this determination to Dr. Singer. The species is very closely allied to the European *C. ochracea* (Kühner) Sing.

Agrocybe praecox (Pers. ex Fr.) Fayod var. *cutifracta* (Lange) Sing. in Sydowia 7: 214 (1953).

3560 m., on dead *Espeletia* sp., first corrie south of Laguna Mucubaji, 24.7.1958; 3550 m., around plant of *E. schultzii*, paramo near Laguna Mucubaji; about 3400 m., amongst *Stereocaulon* at base of *E. schultzii*, Hacienda La Corcovada, Sierra de Santo Domingo, Edo. Mérida, 30.7.1958, *Dennis & Buza* 1724, 1724B, 1724A.

The association with *Espeletia* is probably accidental, due to the great abundance of these plants on the paramos. Singer collected this fungus twice in Tierra del Fuego.

Agrocybe sacchari (Murr.) Dennis in Bull. Soc. mycol. France 69: 180 (1953).

950 m., attached to a small stick amongst grass, Los Palos Grandes (Caracas), Edo. Miranda, 8.6.1958, *Dennis* 1168.

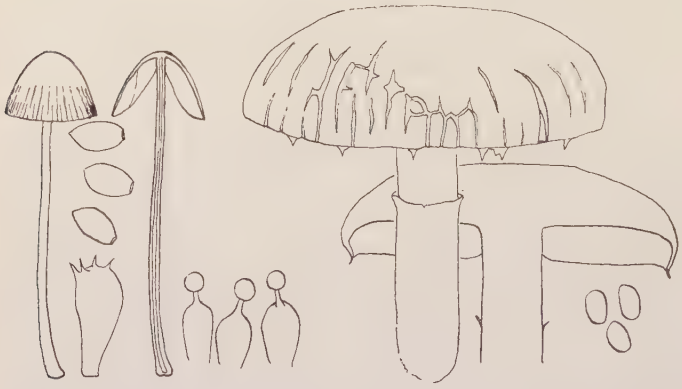


FIG. 94. *Conocybe siennophylla*. Spores, basidium and cheilocystidia × 660.

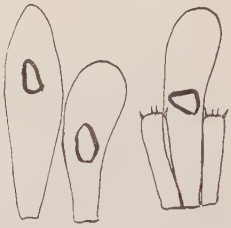


FIG. 95. *Stropharia lasseri*. Spores, cheilocystidia (left) and pleurocystidium (right) × 660.

STROPHARIACEAE

Stropharia lasseri *Dennis*, sp. nov.

Pileus carnosus, convexus, 4·5 cm. latus, levis, nitidus, pellicula demum tesselato-lacera, ochraceo-fulvus, margine albo-dentato; caro alba, odore subraphanoideo praedita, sapore miti; lamellae confertae, postice sinuato-adnatae, 5–6 mm. latae, fusco-cinereae; stipes aequalis, apice albo-pruinatus; infra annulum stramineus, 4 cm. longus, 1 cm. crassus, solidus; annulus inferus, subdistans, zonam angustam circularum relinquens; sporae ellipsoideae-ovoideae interdum inaequilaterales, leves, fusco-purpureae, 6–7 × 4μ; pleurocystidia clavata, 30–40 × 10μ; cheilocystidia clavata vel papillata, 22–40 × 8–12μ; basidia clavata, tetraspora, 22 × 6μ. Fig. 95.

Hab. c. 900 m., in herbidis, Caracas, Dto. Federal, 11.6.1958, *Dennis* 1040 (typus).

Both cheilo- and pleurocystidia mostly contain a large refractive inclusion and are hence Chrysocystidia. The tramal hyphae bear clamps, those of the pileus-surface are brown but not encrusted, prostrate, interwoven, 8–12μ diameter. Possibly this may prove to be the same as *S. troyana* Murrill, from Jamaica, but he described larger spores and a hollow stipe and gave no information about the cystidia.

Stropharia semiglobata (Batsch ex Fr.) Quél., Champ. Jura et Vosges: 172 (1872).

3560 m., on horse dung, near Laguna Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 22.7.1958, *Dennis & Buza* 1704; 1704A.

Hypholoma anomalum A. H. Sm. in Mycologia 33: 2 (1941).

3440 m., in wet moss under trees, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1744. Fig. 96, left.

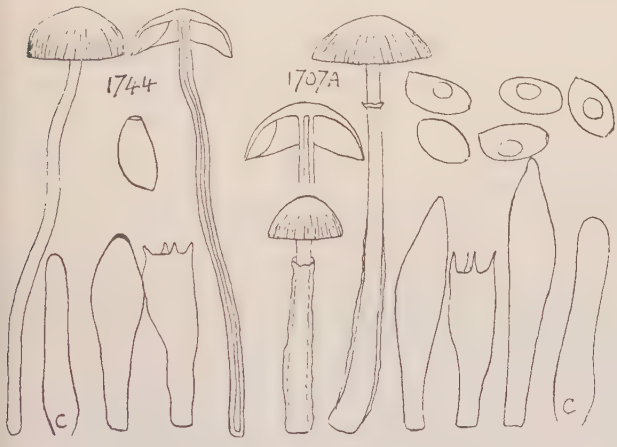


Fig. 96. Left: *Hypholoma anomalum*; Right: *H. anomalum* annulate forma. Spores, basidia, pleurocystidia and cheilocystidia (C) × 660.

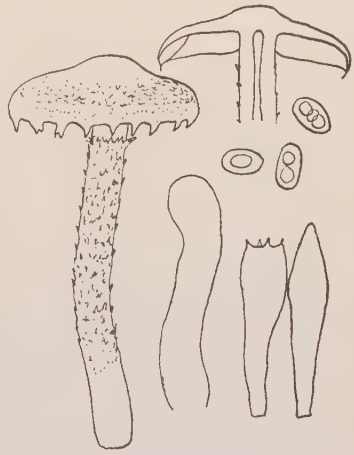


Fig. 97. *Hypholoma vilorianum*. Spores, cheilocystidium, basidium and pleurocystidium × 660.

The following collections appear to represent an annulate state of this species. Taken alone they would be referred to *Stropharia* in the vicinity of *S. inuncta* (Fr.) Quél. but they were closely associated with *Dennis & Buza* 1744, in which there is no trace of a ring and with which they otherwise agree closely. Modern authors are agreed on the close affinity between *Stropharia*, *Hypholoma* and *Psilocybe* and it seems to me more natural to place the annulate collections with *H. anomalum* than to refer them to a different genus. It may be noted that *H. anomalum* was described from a single fruit-body so that its range of variation is unknown.

H. anomalum forma

Solitary, pileus conico-campanulate, up to 2 cm. diameter, Raw Sienna, becoming Olive Ocher from the margin, viscid, margin closely striate; flesh thin, hygrophanous, Olive-ocher in the pileus, Deep Chrome in the

stipe; lamellae crowded, adnate, up to 5 mm. wide, Wood Brown; stipe up to 7 cm. long, 2 mm. wide above, enlarged to 3–6 mm. at the base, at first nearly white throughout, becoming deep chrome below the ring, glutinous in the lower 2/3–3/4, with a very narrow and membranous but persistent colourless ring. Chrysocystidia fusiform to mucronate, 35–53 × 9–11μ; cheilocystidia hyaline, thin-walled, cylindrical to ventricose, 25–40 × 5–8μ; spores ovoid, cinnamon brown, 11–15 × 6–8μ, with a germ-pore; basidia 4-spored, 40 × 8–9μ. Fig 96, right, p. 133.

3560 m., in very wet moss beside rotten sticks in a thicket at the waterfall south of Laguna Mucubaji, 23.7.1958, *Dennis & Buza* 1707A; 3440 m., in forest litter, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1707A2; 31.7.1958, *Dennis* 1769.

Hypholoma capnoïdes (Fr.) Kummer, Fuhrer Pilzkunde: 72 (1871).

About 2500 m., caespitose on a log, La Mucuy, near Tabay, Sierra Nevada, Edo. Mérida, 6.8.1958, *Dennis* 1785.

The species is normally on coniferous logs and stumps. That is possible at La Mucuy where *Podocarpus* timber occurs naturally and imported pines are grown, but cannot be positively stated to have been the case.

Hypholoma confusum *Dennis*, sp. nov.

Pileus carnosus, convexo-planus, subgibbus, 3 cm. latus, argillaceus, ('Clay Color', centro 'Buckthorn Brown'), initio ob velum praecipue ad marginem sericellus, demum glaber; caro in pileo spadicea, hygrophana; lamellae confertae, postice adnatae 4 mm. latae, fusco-ochraceae; stipes aequalis, farctus, 35 mm. longus, 5 mm. crassus, pileo concolor, deorsum fuscescens, infra annulum squamis albis demum evanidis squarrosus; sporae oblongae, truncatae, 5–6 × 3μ, fusco-cinnamomeae; pleurocystidia clavata, vel ventricosa, 20–30 × 7–10μ; cheilocystidia cylindracea 40–45 × 6–10μ. Fig. 98.

Hab. ad truncos in silvis, 2000 m., El Avila, Dto. Federal, 17.6.1958, *Dennis* 1062 (typus).

The pleurocystidia are very inconspicuous but stain strongly with cotton blue. The pileus surface consists of prostrate hyphae 4–12μ wide, their thin walls encrusted with brown pigment, with inflated cells intercalated. The fungus may be taken in the field for a *Pholiota* or *Kuehneromyces*.

Hypholoma sublateritium (Fr.) Quél., Champ. Jura et Vosges: 112 (1872).

c. 3700 m., caespitose on a trunk, forest between Laguna Negra and Laguna de los Patos, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 1761.

Hypholoma subviride (*Berk. & Curt.*) *Dennis*, comb. nov.

Agaricus subviridis Berk. & Curt. in Journ. Linn. Soc., Bot. 10: 292 (1869).

1800 m., on logs, E. Junquito, Dto. Federal, 16.11.1949, *Dennis* 359; on log, forest north of Erin, Trinidad, 6.11.1949, *Dennis* 299; 2100 m., on stump, west slope of Mosman's Peak, Blue Mountains, Jamaica, 22.12.1949, *Dennis* J45.

This is little more than a subtropical state of the common *H. fasciculare* (Huds. ex Fr.) Kummer, of which it has the microscopic characters and bitter taste. It differs in its smaller size and usually more papillate pileus. According to A. H. Smith *H. papillatum* Pat., from Mexico, is a synonym.

Hypholoma vilorianum *Dennis*, sp. nov.

Pileus carnosus, convexo-explanatus, umbonato-gibbus, cinnamomeus ('Sayal Brown'–'Snuff Brown' Ridgway), squamulis floccosis adpressis minutis undique conspersus, 2·5–3·5 cm. latus, centro ochraceo-melleus, glaber; caro flava, in pileo fuscidula, aquosa, sapore miti; lamellae confertae, postice adnatae, citrino-flavae, vel pallide cinnamomeae; stipes e farcto fistulosus, aequalis, saepe curvatus, deorsum ferrugineo-brunneus, fibrillosus vel squamulosus, apice pallidus, 4·5 cm. longus, 5 mm. crassus; sporae ellipsoideae, leves, brunneae, 8–9 (–10·5) × 4·5–5μ; basidia tetraspora, 32 × 9μ; chrysocystidia fusoideo-ventricosa, apice mucronata, 35–40 × 8–10μ; cheilocystidia cylindraceo-clavata vel vesiculosa, 40–50 × 6–12 (–20μ). Fig. 97, p. 133.

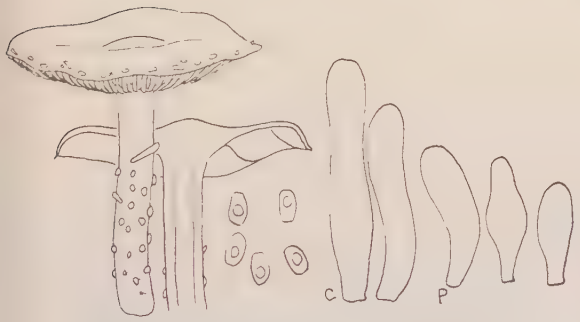


Fig. 98. *Hypholoma confusum*. Spores, cheilocystidia (C) and pleurocystidia (P) × 660.

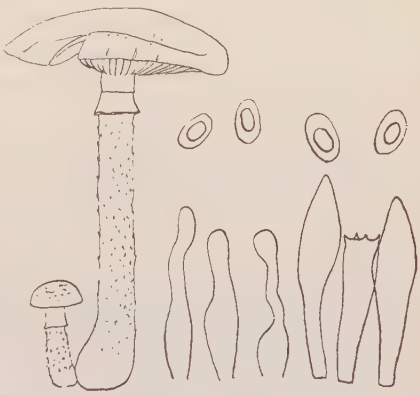


Fig. 99. *Hypholoma polylepidis*. Spores, cheilocystidia and basidium × 660.

Hab. ad truncos arborum frondosarum, 3440 m., Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 1.8.1958, *Dennis* 1780 (typus).

The hyphae of the pileus-surface and squamules are 8–12μ wide, with thin walls coarsely encrusted with brown pigment. *Dennis* 1737A from the same locality is probably an older state of *H. vilorianum* in which the pileus has become Marguerite Yellow with a brownish disc, subviscid and smooth except for a trace of squamules near the margin.

Hypholoma polylepidis *Dennis*, sp. nov.

Pileus tenui-carnosus, e convexo-campanulato explanato-depressus, glaber, primitus levis dein rimoso-areolatus vel radiato-rimosus, 3 cm. latus, brunneolus ('Natal Brown'), squamis villosis obscurioribus dense obsitus; caro cinnamomeo-umbrina; lamellae confertae, postice sinuato-adnatae, cinnamomeo-umbrinae, 3–4 mm. latae; stipes aequalis, 4 cm. longus, 4 mm. crassus, fistulosus, cinnamomeo-brunneus, squamis verrucaeformibus squarrosis brunneolis pulchre variegatus, basim versus subglabratus, basi

bulbosus, 6–7 mm. crassus, supra annulum levis et albo-sericeus; annulus inferus, floccosus, circulum squamiformem circa stipitem relinquens; sporae ellipsoideae, leves, brunneae, 8–10 × 4–6μ; basidia clavata, tetraspora, 30 × 6μ; chrysocystidia fusoideo-ventricosa, 35–40 × 8–9μ; cheilocystidia cylindracco-ventricosa vel subcapitata, hyalina, 30 × 2–7μ. Fig. 99, p. 135.

Hab. 3600 m., subcaespitosa, ad basim truncorum *Polylepidis sericeae*, Sierra de Santo Domingo, Edo. Mérida, 24.7.1958, *Dennis & Buza* 1723 (typus).

The superficial hyphae of the pileus are thin-walled, 5–12μ wide, with brownish encrustation. The above collection lacks the yellow pigment of *H. vilorianum*, except for the chrysocystidia, and can scarcely be referred to it on the available evidence. In microscopic characters the two agree closely, however, and it remains possible that they may eventually be shown to be states or extreme variants of a single species.

Psilocybe atrorufa (Schaeff. ex Fr.) Quél., Champ. Jura et Vosges: 117 (1872).

About 3560 m., amongst *Polytrichum* on moraines, Mucubaji valley, Sierra de Santo Domingo, Edo. Mérida, 24.7.1958, *Dennis & Buza* 1727.

The Venezuelan material has rather longer cheilocystidia than the common European form, viz. 20–32 × 5–8μ, but in all other respects agrees with it.

Psilocybe coprophila (Bull. ex Fr.) Kummer, Fuhrer Pilzkunde: 71 (1871).

On donkey dung, St. Augustine, Trinidad, 18.10.1949, *Dennis* 193.

Psilocybe cf. *Ps. modesta* (Peck) A. H. Sm. in Mycologia 40: 700 (1948).

Pileus 12 mm. diameter, convex with a low umbo, hygrophanous, date brown with closely striate margin, drying pale ochraceous; flesh thin; lamellae rather crowded, horizontal, wedge-shaped, adnate, 2 mm. broad, dark brown with whitish margin; stipe equal, 20 × 1·5 mm., concolorous but clothed with white fibrils; spores somewhat trapezoidal, 5·5–6 × 4–5μ; with a germ-pore; cheilocystidia abundant, ventricose, 15–24 × 4–5μ; pleurocystidia absent. Fig. 102, p. 138.

About 2500 m., solitary on bare soil near summit of La Silla, Dto. Federal, 4.7.1958, *Dennis* 1141.

Hypholoma modestum Peck was described as growing on bark and fallen twigs but the description, as emended by Smith, agrees too well with the Venezuelan fungus for me to venture to differentiate the latter on the basis of a single fruit body. The spores recall *P. rhombispora* (Britz.) Kühner & Romagnesi but the latter is a fungus of leaf-litter in forests. *P. mammillata* (Murr.) A. H. Sm., described from soil in Jamaica, differs in having pleurocystidia and in being persistently conical and not striate.

Psilocybe plutonia (Berk. & Curt.) Sacc., Syll. Fung. 5: 1056 (1887).

Scattered, pileus conico-campanulate then expanded with a small papillate umbo, up to 2·5 cm. diameter, smooth, closely pellucidly striate 2/3 of the way to the umbo, clay colour, becoming black; flesh thin, hygrophanous, fuscous; lamellae crowded, ventricose, 3 mm. wide, of 3 lengths, ascending, adnate, light brown then almost black with a conspicuous white

margin; stipe equal or slightly enlarged at the base, flexuous, up to 50 × 1·5 mm., dark brown, closely zoned with adpressed whitish fibrils, apex pruinose, hollow, flesh reddish brown. Pleurocystidia ventricose, hyaline, 20–22 × 8–11μ; cheilocystidia cylindrical to fusoid, hyaline, 30 × 6–10μ; spores flattened, spade-shaped, grey-brown, 5–6 × 4–5 × 3–3·5μ, with a small apical germ-pore, basidia 4-spored. Fig. 100.

About 800 m., on the ground in a forested gully, Guatopo, Edo. Miranda, 25.6.1958, *Dennis* 1101.

The type was on rotten wood in Cuba. It is not certain, however, that the Venezuelan material was not also springing from buried wood, for the stipes have rooting bases. *Atylospora cinchonensis* Murr. seems very similar and grew on soil, in Jamaica, but its stipe was described as glabrous and it apparently lacked the conspicuous sterile white gill-edge.

FIG. 100. *Psilocybe plutonia*. Spores and cystidium × 660.

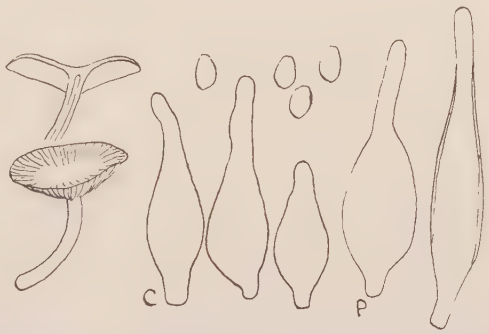


FIG. 101. *Psilocybe venezuelana*. Spores, cheilocystidia (C) and pleurocystidia (P) ×660.

Psilocybe venezuelana *Dennis*, sp. nov.

Pileus 1·5–2 cm. latus, ex hemisphaerico-applanatus, umbilicatus, margine striatulus, levis, glaber, hygrophanus, purpureo-fuscus, sicco expallens; lamellae subconfertae, 2·5 mm. latae, planae, postice adnato-subdecurrentes, umbrinae; stipes aequalis, tenuis, 1·5–2 cm. longus, 1·5 mm. crassus, saepe curvatus, glabriusculus, purpureo-brunneus, fistulosus; pleurocystidia cylindraceo-ventricosa, 40–65 × 9–15μ; cheilocystidia 30–65 × 9–12μ; sporae late ellipsoideo-ovoideae, fusco-violaceae, 6–7·5 × 4–4·5μ. Fig. 101.

Hab. 2000 m., ad terram arenosam, El Avila, Dto. Federal, 13.6.1958, *Dennis* 1048 (typus).

The fungus has the air of *P. atrorufa* but differs in its abundant large pleurocystidia. The spores are smaller than those of *P. lateritia* (Murr.) A. H. Sm., from Jamaica.

Melanotus sp.

About 2200 m., on herbaceous stem in forest, La Mucuy, Sierra Nevada, Edo. Mérida, 6.8.1958, *Dennis* 1790.

Pileus 5 mm. diameter, spores ovoid, 6–7 × 4–5μ, cheilocystidia about 20 × 5μ. I defer proposing a name for this collection until a revision of *Melanotus* is available.

Melanotus aff. *M. alpiniae* (Berk.) Sing.

3440 m., on under side of a log, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1743. Fig. 103.

Spores 6–6·5 × 3·75–4μ, cheilocystidia 20–30 × 5–7μ, necks slender, subcapitate.

Pholiota aurivella (Batsch ex Fr.) Kummer, Fuhrer Pilzkunde: 83 (1871).

Pileus convex, then expanded with a broad low umbo, up to 13 cm. diameter, yellow ochre with minute, evanescent, tawny squamules, covered with a layer of yellowish gluten; lamellae rather crowded, adnate, 1 cm. broad, brown; stipe cylindrical or slightly fusoid, about 8 × 1–1·5 cm., sometimes with a well developed basal bulb, Sanford's Brown, dry, fibrillose and covered below the narrow evanescent ring with fugacious light brown recurved squamules. Flesh solid, thick at the disc, pinkish cinnamon with yellowish streaks, taste mild. Cheilocystidia cylindrical or slightly ventricose, often undulating, thin-walled, with yellow sap, up to 60 × 5–10μ; chrysocystidia clavate with a small mucro, thin-walled, about 35 × 10–13μ, with golden-yellow oily contents. Spores elliptical, brown, smooth, 6·5–10 × 4–5·5μ.

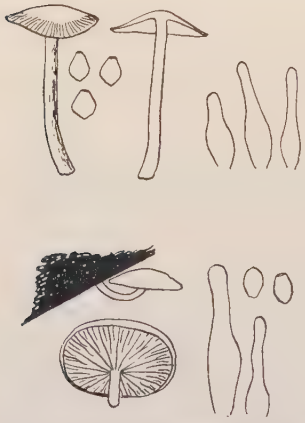


Fig. 102 (top). *Psilocybe* cf. *Ps. modesta*. Spores and cheilocystidia × 660.

Fig. 103 (bottom.) *Melanotus* aff. *M. alpiniae*. Spores and cheilocystidia × 660.

Fig. 104. *Pholiota glutinosipes*. Spores and cystidia × 660.

3440 m., on a prostrate trunk in dense forest, E. shore of Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 1.8.1958, *Dennis* 1770.

The above material differs from European collections of *P. aurivella* in its less distinctly squamulose pileus and in the bulbous base to the stipe but the latter character is not always well developed. It is the same as var. *squarrosipes* Sing., recorded from the forests of the Argentine Andes.

Pholiota glutinosipes *Sing.*, sp. nov.

Pi eus carnosus, convexo-expansus, glutinosus, pallidus, fibrillis adnatis rubro-fuscis longitudinaliter percursus, 3·5 cm. latus; caro cinnamomeo-

fulva; lamellae confertae, pallidae, postice adnatae, 4 mm. latae; stipes ventricosus, solidus, 1 cm. crassus, albidus; cortina alba, glutinosa; sporae ellipsoideae, brunneae, leves, 5·5–6 (–7·5) × 3–4 (–5)μ; cystidia ventricosa, 55–80 × 10–15μ. Fig. 104.

Hab. 3440 m., ad terram in silvis, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1736 (typus).

Only a single carpophore was found and the fungus probably attains a greater size than indicated above. The pleurocystidia and cheilocystidia are alike and have their beaks filled with dense cytoplasm.

Pholiota privigna (*Speg.*) *Sing.*, comb. nov.

Agaricus privignus Speg. in Bol. Acad. Nac. de Ciencias de Cordoba 11: 148 (1887).

Solitary; pileus hemispherical, dull yellowish-brown, 2 cm. diameter, smooth, possibly with a very thin viscid pellicle as it sticks to paper on drying; flesh thin, concolorous in the pileus, clay colour in the stipe, tasteless; lamellae of 2 lengths, adnate with a slight tooth, 3–4 mm. wide, Vinaceous Buff; stipe cylindrical, 4 cm. long, 2·5–3 mm. wide, concolorous above, darker brown below, smooth, without a ring. Cheilocystidia ventricose, obtuse, 35–45 × 10–13μ; pleurocystidia similar but larger and with longer more slender necks, 55–75 × 12–20μ, sometimes with oily yellow contents in the necks; spores elliptical, smooth, brown, 9–11 × 5·5–7·5μ, print dull brown; pileus-surface formed of thin brown hyphae. Fig. 105.

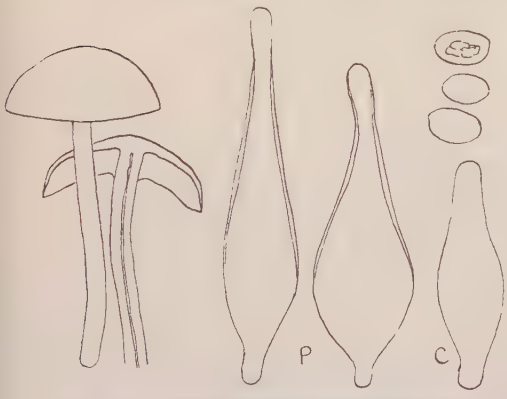


Fig. 105. *Pholiota privigna*. Spores, pleurocystidia (P) and cheilocystidium (C) × 660.

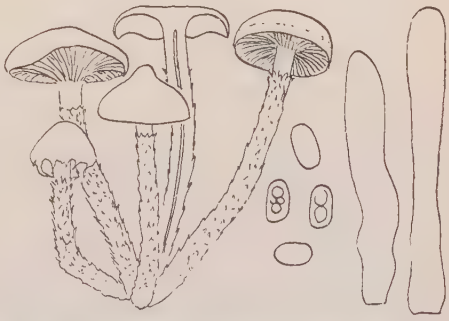


Fig. 106. *Pachylepidium nubicola*. Spores and cystidia × 660.

3440 m., on mossy soil under trees, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1737.

Spegazzini described this species from amongst *Sphagnum* in Staten Island and on Tierra del Fuego. I owe the determination to Dr. Singer.

Pachylepyrium nubicola *Sing.*, sp. nov.

Caespitosus; pileus carnosus, conico-campanulatus dein convexus, cinnamomeus, ("Cinnamon Buff—Clay Color"), levis, ad 2 cm. latus; caro hygrophana, ochraceo-fulvidula, in pileo brunnea; lamellae confertae, adnatae,

3 mm. latae, pallide cinnamomeae; stipes fistulosus, aequalis, 4 cm. longus, 3 mm. crassus, cinnamomeus, deorsum brunneus, fibrilloso-squamulosus. Basidia tetraspora; sporae ellipticae, ochraceae, leves, 7–9 × 4–4·75μ; cellulae aciei lamellarum cylindraceae, obtusae, undulatae, c. 50 × 7–8μ. Fig. 106.

Hab. 3600 m., ad truncos arborum frondosarum in silvis, Laguna Negra—Laguna de los Patos, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 1768 (typus).

In the field I took this for *Kuehneromyces mutabilis* but the spores are too large, paler, the wrong shape and the germ pore, if present, is much more obscure and the cystidia much too big.

CORTINARIACEAE

Inocybe lasseri Dennis in Bull. Soc. mycol. France 69: 197 (1953).

About 950 m., Rio Chacaito, Caracas, 18.11.1949, *Dennis* 335

Gymnopilus pratensis Sing. in Lilloa 25: 371 (1952).

Solitary; pileus broadly convex, 2 cm. diameter, Sanford's Brown with Ochraceous tawny patches, dry, minutely tomentose; flesh Cinnamon Buff, taste mild, rather thick for the size of the pileus; lamellae crowded, horizontal, adnate but slightly sinuate, 4 mm. wide, ferruginous, perhaps at first yellow as they yield a yellow solution in ammonia; stipe short, 18 × 2·5 mm., cylindrical, solid, brown, fibrillose but with no trace of a ring or zone of a cortina. Pileus-surface formed of hyphae 8–10μ wide, with brown encrusted walls; cheilocystidia ventricose, hyaline, about 25 × 6μ below and 3μ above; no pleurocystidia; basidia 4-spored, 5μ wide, with long sterigmata; spores reddish-brown, 6–7·5 × 3·5–4μ, with slightly roughened walls and no germ-pore. Fig. 107.

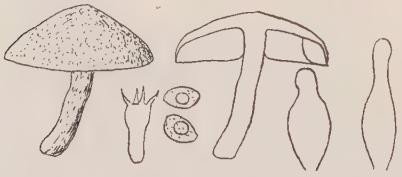


Fig. 107. *Gymnopilus pratensis*. Basidium, spores and cheilocystidia × 660.

Fig. 108. *Naucoria ovalis*. Spores and cheilocystidia × 660.

About 2500 m., on bare soil of the summit ridge above the cloud-forest, La Silla, Dto. Federal, 4.7.1958, *Dennis* 1142. Determined by Dr. Singer.

Pyrroglossum pyrrhus (Berk. & Curt.) Sing. in Mycologia 36: 367 (1944).

800 m., on logs, Guatopo forest, Edo. Miranda, 27.6.1958, *Dennis* 1162.

Naucoria carpophila (Fr.) Quél., Champ. Jura et Vosges: 102 (1872).

Pileus hemispherical, then convex, Warm Buff to Cinnamon Buff, paler at the margin, pruinose, up to 1 cm. diameter; lamellae adnate, horizontal, about 1 mm. broad, avellaneous, stipe cylindrical, undulating, about 20 × 1 mm., light brown with white fibrils, hollow; flesh thin, brown. Pileus-

surface covered with loose, thin-walled, smooth, almost colourless, spherical cells, 10–20μ diameter; cheilocystidia numerous, hyaline, ventricose, 20–40μ long, 3–4μ thick above, 6–7μ below; spores ovoid, smooth, very pale yellowish brown, (7)–8–9 × (3·5)–4–4·5μ.

3440 m., on forest debris, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1747.

Naucoria ovalis *Sing.*, sp. nov.

Pileus lateralis, reniformis, convexus, mollis, glaber, ochroleucus, 5 mm. diam.; lamellae subconfertae, lineares, ex albis cinnamomeae; stipes lateralis, subnullus, albus; cheilocystidia cylindracea, capitata, 30 × 3–5μ; sporae ellipticae, leves, brunneae, 6–7 × 5μ. Fig. 108.

Hab. 900 m., ad ramulos dejectos, Caracas, Dto. Federal, *Dennis* 1072 (typus).

FIG. 109. *Phaeomarasmius confragosulus*. Hypha of pileus-surface, cheilocystidia, spores and basidium × 660.

FIG. 110. *Galerina dominici*. Spores, basidium and cheilocystidia × 660.

Phaeomarasmius confragosulus Sing. in Rev. Mycol., N.S. 18: 20 (1953).

Scattered; pileus campanulate then somewhat expanded, up to 1 cm. diameter, reddish brown, margin translucently striate, surface dry, very minutely pruinose with the protruding hyphal tips; flesh thin, concolorous, watery; lamellae subdistant, of 3 lengths, horizontal, adnate with a slight tooth, concolorous; stipe cylindrical, about 12 × 1·5 mm., curved, concolorous, at first with a white cortina which leaves a narrow ring of white fibrils on the stipe a little above the middle. Pileus-surface of prostrate hyphae, 10–15μ wide, with thin brown walls, finely encrusted with brown matter in broken stripes across the hypha, with small clamps, terminal cells somewhat broad and pyriform; cheilocystidia abundant, cylindrical or slightly ventricose, obtuse, hyaline, up to 55 × 6μ; spores elliptical, smooth, without a germ-pore or obvious apiculus, yellowish-brown, 7–8·5 × 4·5–5·5μ; basidia 4-spored, 20 × 6·5μ. Fig. 109.

About 2000 m., amongst moss on rotting log in cloud-forest, El Avila, Dto. Federal, 17.6.1958, *Dennis* 1059; on mossy stick, Mt. Periquito, Rancho Grande, Edo. Aragua, 20.11.1949, *Dennis* V53.

Galerina dominici Sing., sp. nov., ined.

Gregarious; pileus campanulate, 1 cm. diameter, smooth, light brown, striate, flesh thin; lamellae narrow, ascending, adnate, brown, of 2 lengths;

stipe 35 × 1 mm., brown, smooth, without ring or cortina. Pileus-surface composed of thin-walled hyphae, encrusted with brown pigment. Basidia 4-spored, 20 × 7; spores elliptical, brown, smooth, (8)–9·5–11 × 5–6μ; cheilocystidia abundant, hyaline, narrowly ventricose with long beaks and slightly enlarged rounded tips, 40–60 × 5–7μ; no pleurocystidia. Fig. 110, p. 141.

3440 m., in moss on trees, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 2506.

Galerina sp.

Solitary; pileus hemispherical, dark brown, smooth, striate; 1·5 cm. diameter; lamellae ascending, adnate, ferruginous, of 3 lengths; stipe cylindrical, dark brown with a zone of white fibrils near the tip, smooth. Pileus-surface of broad hyphae, with clamps; basidia 4-spored, 27–30 × 9–10μ, sterigmata large, 7–10 × 2μ; spores 11–14 × 7–8μ, yellowish-brown, smooth, ellipsoidal with a minute, obscure, apical germ-pore; cheilocystidia abundant, hyaline, cylindrical to ventricose, obtusely rounded, 35–40 × 6–10μ, no pleurocystidia; hairs of the stipe above the cortina similar to the cheilocystidia. Fig. 111.

3560 m., in very wet moss, valley near Laguna Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 24.7.1958, *Dennis & Buza* 1727A.

Fig. 111. *Galerina* sp. Spores, basidium and cheilocystidia × 660.

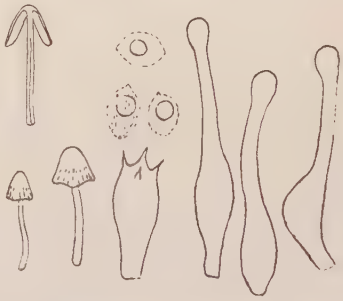


Fig. 112. *Galerina hypsizyga*. Spores, basidium and cheilocystidia × 660.

Galerina hypsizyga A. H. Sm. & Sing., sp. nov., ined.

Scattered; pileus up to 6 mm. diameter, conico-campanulate, reddish-brown, smooth, dry, pellucidly striate half way to the apex; stipe cylindrical, 13 × 1 mm., concolorous, smooth, without ring or cortina; lamellae rather crowded, ascending, adnate, 1 mm. wide, brown; flesh thin, yellowish. Hyphae of the pileus-surface about 5μ wide, thin-walled, non-encrusted, with clamps, bearing scattered hairs, thin-walled, ventricose, about 30 × 6μ; cheilocystidia abundant, hyaline, ventricose with long slender neck and slightly enlarged apex, 30–50 × 6–7μ, apex 3–5μ; pleurocystidia absent; basidia 4-spored, 9μ wide; spores elliptical, with small apiculus and rather pointed tip, reddish-brown, 8·5–11 × 6–6·5–(7)μ, with 1 or occasionally 2 guttules, surface distinctly rugose; hairs of the upper part of the stipe similar to the cheilocystidia. Fig. 112.

About 3560 m., on peaty soil amongst *Cladonia* squamules and small mosses, paramo near Laguna Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 22.7.1958, *Dennis & Buza* 1700.

Galerina subpapillata A. H. Sm. & Sing., sp. nov., ined.

Subcaespitose, pileus campanulate with a small low umbo, 1 cm. diameter, smooth, clay colour, margin striate; flesh thin, watery gray, hygrophanous; lamellae of 3 lengths, ascending, adnexed, ochraceous buff, 1·5 mm. wide; stipe 24 × 2 mm., slightly bulbous at the base, hollow, orange-cinnamon, zoned with white fibrils below the point of attachment of the cortina. Pileus-surface of parallel hyphae 5–9μ wide; cheilocystidia abundant, ventricose with a conspicuous globose apex and short ill-defined neck, hyaline, 45–50 × 8–12μ, apex 11–15μ; pleurocystidia abundant, similar, 40–50 × 6–22μ, head 11–14μ; Spores amygdaloid, reddish-brown, (7·5)–9–11 × 5–6μ, surface distinctly rugose. Fig. 113.

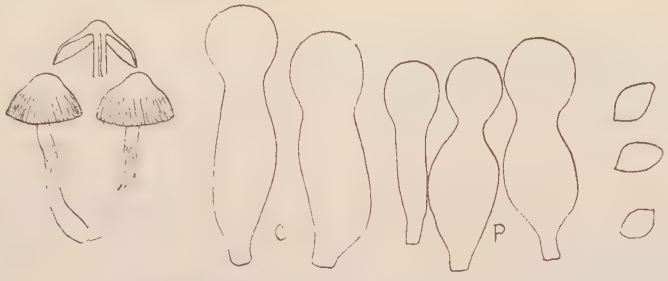


Fig. 113. *Galerina subpapillata*. Cheilocystidia (C), pleurocystidia (P) and spores × 660.

3440 m., on rotting wood in forest, E. shore of Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 1.8.1958, *Dennis* 1774; in very wet moss, same locality, 26.7.1958, *Dennis* 1727B.

CREPIDOTACEAE

Tubaria velata *Dennis*, sp. nov.

Pileus carnosulus, e convexo planus, 1·5 cm. latus, aureo-fulvus ('Deep Chrome' Ridgway) margine striatus; velum album appendiculatum; caro brunnea ('Raw Sienna' Ridgway); lamellae confertae, 2–2·5 mm. latae, postice adnatae, ochraceo-cinnamomeae ('Light Ochraceous Buff' Ridgway); stipes aequalis, curvatus, fistulosus, 2·5 cm. longus, 2·5 mm. crassus, albido-fibrillosus, basi albo-floccosus, dein glabratus, ochraceus ('Yellow Ochre' Ridgway); cheilocystidia cylindraceo-ventricosa vel subcapitata, 40 × 7μ; basidia tetraspora; sporae ellipticae, pallide flavo-ferrugineae, 6·5–7·5 × 5–6μ, 1–3 guttulatae. Fig. 115.

Hab. 3440 m., subcaespitosus ad truncos vetustos, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 27.7.1958, *Dennis & Buza* 1748 (typus).

Crepidotus brunswickianus Speg. in Bol. Acad. Nac. Ciencias de Cordoba 11: 13 (1887).

Pileus sessile, attached by a point, semicircular, convex, pendent, cadmium yellow; surface minutely downy in the upper part, becoming smooth towards the margin; flesh thick, whitish under the yellow cuticle, devoid of gelatinous tissue; lamellae radiating from the point of attachment, crowded, up to 9 mm. wide, tapering towards each end, salmon colour. Cheilo-

cystidia vesicular, clavate, thin-walled, c. 25 × 10–13μ; spores subglobose, 7–8·5 × 6–7μ, brown, regularly ornamented with distinct low warts spaced about 1μ apart. Fig. 114.

About 3600 m., on stump in forest between Laguna Negra and Laguna de los Patos, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 1760.

This differs from *C. nephrodes* and *C. crocophyllus* in its darker coloured, more distinctly warted and less perfectly globose spores and probably in its deeper yellow pileus. *C. brunswickianus* was described by Spegazzini from *Nothofagus antarctica* in Patagonia and recorded again from *Maytenus magellanica* in Tierra del Fuego. I owe the determination to Dr. Singer.

Crepidotus martini Sing. in Mycologia 47: 775 (1955).

900 m., on sticks, Botanic Garden, Caracas, Dto. Federal, 19.6.1958, *Dennis* 1074; same locality, 14.7.1958, *Dennis* 1128A; on soil 11.7.1958, *Dennis* 1616. Determined by Dr. Singer.

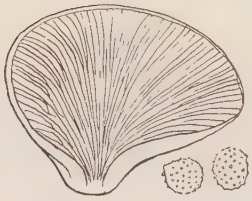


Fig. 114. *Crepidotus brunswickianus*. Spores ×660.

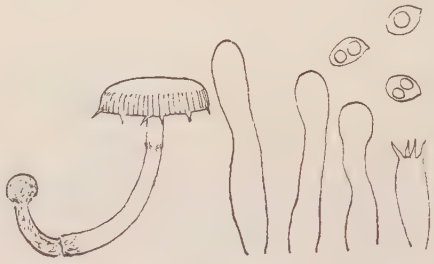


Fig. 115. *Tubaria velata* var. *brasiliensis*. Cheilocystidia, basidium and spores × 660.

Crepidotus sublevisporus Sing. in Lilloa 25: 410 (1952).

2400 m., Rancho Grande, Edo. Aragua, 19.11.1949, *Dennis* 340.

This collection was described in Bul. Soc. mycol. France under the name *C. albidus* Ell. & Ev., from which it differs in lacking clamp connections. The redetermination is due to Dr. Singer.

Crepidotus uber (Berk. & Curt.), Sacc., var. **brasiliensis** (*Rick.*) *Sing.*, comb. nov.

C. brasiliensis Rick in Broteria 24: 116 (1930).

Scattered; pileus semicircular, sessile, attached by a point, 4–6 mm. across, margin thin, striate, primrose yellow to colonial buff, sometimes brownish towards the base; flesh thin, white; lamellae radiating from the point of attachment, of several lengths, about 1 mm. wide, sometimes forked near the margin, honey yellow. Cheilocystidia abundant, hyaline, thin-walled, ventricose and beaked, 20–35 × 5–6μ, the tip of the beak often recurved in fresh material, no pleurocystidia; spores pip-shaped, yellowish brown, smooth, 5·5–8 × 4–5μ. Fig. 116.

About 900 m., on vertical side of a stump, Botanic Garden, Caracas, Dto. Federal, 1.7.1958, *Dennis* 1128. Determined by Dr. Singer.

Crepidotus velutino-affinis Sing., sp. nov., ined.

Pileus convexus, membranaceus, spathulatus, 5 mm. diam., rubro-fulvus; lamellae paucae, sublineares, valde distantes, postice adnatae, cinnamomeae; stipes excentricus, aequalis, 2 × 1 mm., pallidus, basi tomentosus; basidia tetraspora, 25–27 × 8–9μ; sporae globosae, verrucosae, 7–8 × 7μ, cinnamomeae; cheilocystidia cylindraceo-clavata, hyalina, 40–60 × 4·5–5μ. Fig. 117.

Hab. 3440 m., solitaria, inter muscos, Laguna Negra, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 1801 (typus).

Pileus-surface of prostrate hyphae bearing hairs like the cheilocystidia.

Crepidotus polylepidis Sing., sp. nov., ined.

Pileus convexus, vix 1 cm. diam., ochraceus, pruinosus; lamellae subdistantes, cinnamomeae, acie albo-fimbriatae; stipes brevis, centralis dein lateralis; cheilocystidia lageniformia, 30–80 × 7–8μ, mucronata; sporae globosae, cinnamomeae, leves, 6–7μ, diam., 1-guttulatae. Fig. 118.

Hab. 3650 m., In ramulis emortuis *Polylepidis*, Sierra de Santo Domingo prope Mucubaji, Edo. Mérida, 24.7.1958, *Dennis & Buza* 1726 (typus).

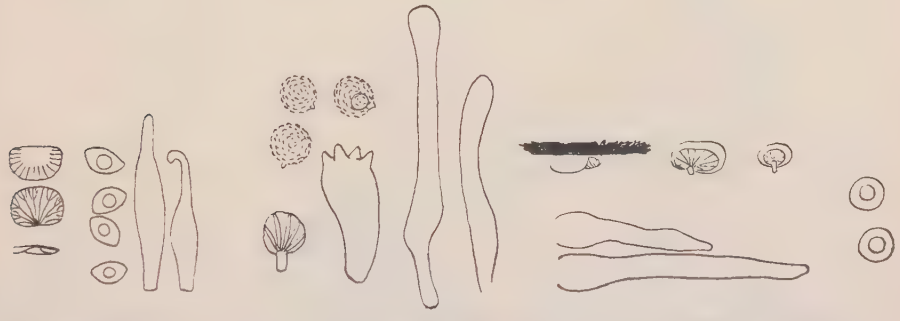


Fig. 116. *Crepidotus uber*. Spores and cheilocystidia × 660.

Fig. 117. *Crepidotus velutino-affinis*. Spores, basidium and cheilocystidia × 660.

Fig. 118. *Crepidotus polylepidis*. Cheilocystidia and spores × 660.

RHODOPHYLLACEAE

Eccilia porcelanica *Dennis*, sp. nov.

Pileus hemisphericus, 2 cm. latus, fusco-umbrinus, sicco pallidus, glaber, dein in areolas diffractum; caro pallida, crassa, odore farinaceo; lamellae confertae, 3 mm. latae, 'Light Cinnamon Drab', decurrentes; stipes aequalis, 40 × 4 mm., concolor, longitudinaliter striatulus, basi albus, solidus; basidia tetraspora, 35 × 9μ, sporae ellipsoideae, 6·5–7·5 × 5–5·5μ, 6–7 angulatae. Fig. 119, p. 146.

Hab. 3440 m., locis muscosis humidis in silvis alpinis, Laguna Negra, Sierra de Santo Domingo, Mérida, 27.7.1958, *Dennis & Buza* 1733 (typus).

The pileus-surface is formed by a tissue about 40μ thick composed of compact, prostrate, short-celled hyphae, 2–3μ wide, with thin brown walls and, in the outermost layer, opaque dark brown contents; overlying

this tissue is a structureless hyaline cuticle 7μ thick, which presumably gives the opaque, whitish, cracked appearance to the pileus. The tramal hyphae are hyaline, about 10μ wide.

Entoloma andinum *Dennis*, sp. nov.

Pileus leviter carnosus, 22 mm. latus, e convexo explanatus, dein depressus glaber, hygrophanus, umbrinus, 'Saccardo's Umber', margine inflexo, striatulo; caro fusca, inodora; lamellae subdistantes, emarginatae, 4 mm. latae, e griseis luride incarnatae; stipes e basi inflata attenuatus, concolor, longitudinaliter striatulus, fistulosus, basi albo-puberulus; basidia tetraspora, 40 × 10μ, sporae subglobosae, 8–10 × 7–9μ, 5–6 angulatae. Fig. 120.

Hab. 3440 m., Laguna Negra, Sierra de Santo Domingo, Mérida, 27.7.1958, *Dennis & Buza* 1741 (typus).

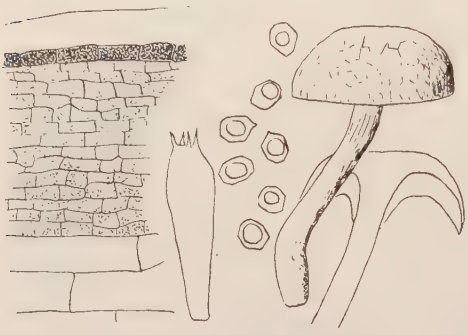


FIG. 119. *Eccilia porcelanica*. Section of pileus-surface, basidium and spores × 660.

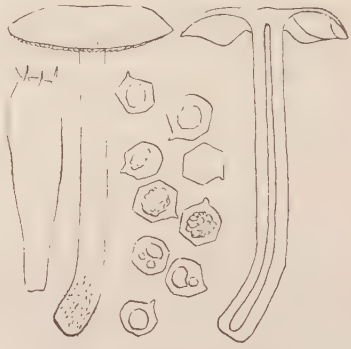


FIG. 120. *Entoloma andinum*. Basidium and spores × 660.

The type specimen was attached to the base of a rotten plant of *Espeletia schultzii* but I do not stress this as it seems hardly likely to be parasitic on this or any other host. The pileus-surface is composed of prostrate hyphae 12μ wide, with granular light brown contents. There are no cystidia but worm-like conducting hyphae occur in the trama and their tips may protrude beyond the basidia at the gill-edge. *E. andinum* bears a marked resemblance to *E. turbidum* (Fr.) Quél. sensu Bresadola from which it differs in its dark stipe and dark flesh. *E. turbidum* has been diversely interpreted by European authors and it appears better to describe the Andean fungus as a new species than to treat it as a variant of a disputed European fungus. It is distinguished from *Rhodophyllus sericeoïdes* Lange by its larger spores.

Entoloma alboconicum *Dennis*, sp. nov.

Pileus conico-campanulatus, dein expanso-umbonatus, sericeus, albus, 1·5 cm. altus; caro alba; lamellae subconfertae, pallidae, acie primitus minute albo-fimbriatae; stipes aequalis, cavus, albus, longitudinaliter albo-fibrillosus, 5 cm. longus, 4–5 mm. crassus; basidia tetraspora, 45 × 12μ; sporae oblongae, 14–16 × 9–12μ, 5–6 angulata; cellulae acie lamellarum cylindraceae, 40–65 × 8–12μ. Fig. 121.

Hab. ad terram in hortis, Caracas, Dto. Federal, 20.8.1958, *Dennis* 2537 (typus).

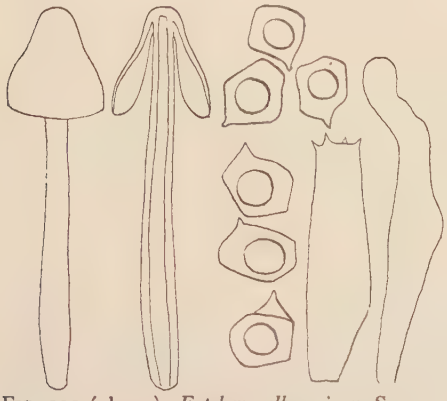


FIG. 121 (above). *Entoloma alboconicum*. Spores, basidium and cheilocystidium × 660.

FIG. 122 (right). *Entoloma atropileatum*. Spores × 660.

FIG. 123. *Entoloma cystidiophorum*. Spores, basidium and cystidia × 660.

Entoloma atropileatum *Dennis*, sp. nov.

Pileus convexus, subumbilicatus, 2 cm. latus, squamulis parvis centro obsitus, ambitu fibrillosus, atro-fuscus; caro inodora; lamellae emarginatae, 4 mm. latae, 'Pinkish Buff'; stipes subaequalis, 35 × 4–5 mm., longitudinaliter fibrillosus, fistulosus, nitidus, pallide griseus; basidia tetraspora, sporae 9–11 × 7–8μ, 5 angulatae. Fig. 122.

Hab. 1800 m., ad terram in silvis, El Junquito, Dto. Federal, 10.6.1958, *Dennis & Foldats* 1032 (typus).

Pileus-surface covered with parallel hyphae, about 12μ wide, with vacuolate, pale purplish grey contents. This differs from *Leptonia venezuelana* in stature, in the hollow stipe, the absence of cheilocystidia and the spore-shape. *Eccilia jamaicensis* Murrill seems to be rather similar but grew on wood and its author does not mention the tendency to scaliness such as occurs around the disc of *E. atropileatum*.

Entoloma cystidiophorum *Dennis*, sp. nov.

Pileus carnoso-membranaceus, e campanulati-convexo expansus, 6 cm. latus, centro obscuriore, fusco, e fibrilloso-squamuloso glabrescens; caro alba, 2–3 mm. crassa; lamellae confertae, sinuatae, 9 mm. latae, ex albis pallide carneolae; stipes aequalis vel ventricosus, ad 8 × 2 cm., longitudinaliter fibrillosus, farctus, albus; basidia tetraspora, clavata, 33 × 12μ, sporae subglobosae, 9–10 × 8μ, 4–6 angulatae; cystidia fusoideo-ventricosa vel clavata, pedicellata, 44–76 × 15–20μ. Fig. 123, p. 147.

Hab. 2000 m., ad terram in silvaticus humidis, El Avila, Dto. Federal, 17.6.1958, *Dennis* 1057 (typus).

The pileus-surface is covered with parallel hyphae, about 10μ wide, filled with brown granules; both pleurocystidia and cheilocystidia are very abundant, filled with yellowish sap.

Fig. 124 (above). *Leptonia guatopoana*. Spores × 660.

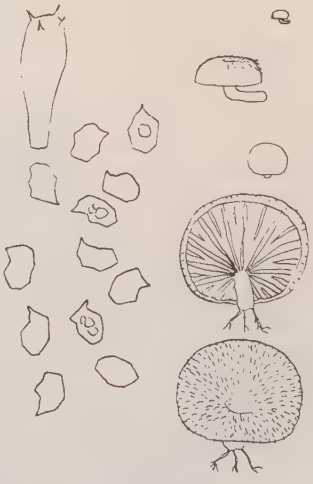


Fig. 125 (on right). *Leptonia lazulino-ardesiaca*. Carpophores natural size and enlarged, basidium and spores × 660.

Entoloma metale (Romagnesi) Dennis in Bul. Soc. mycol. France 69: 160 (1953).

2400 m., on soil in cloud forest, Rancho Grande, Edo. Aragua, 20.11.1949, *Dennis* V55.

Leptonia guatopoana *Dennis*, sp. nov.

Pileus convexus, 2 cm. latus, melleus, pruinosus, sulcati-striatulus; caro alba, inodora; lamellae distantes, postice adnatae, 3 mm. latae, pallidae; stipes aequalis, 30 × 1·5–2 mm., fistulosus, albidus, pruinatus; basidia tetraspora, sporae 10–12 × 6–7·5μ, 7–8 angulatae, Fig. 124.

Hab. 800 m., ad truncos vetustos in silvis, Guatopo, Miranda, 27.6.1958, *Dennis* 1118 (typus).

The pileus-surface consists of prostrate hyphae, up to 15μ wide, with yellowish brown sap, the terminal cells clavate, about 20–60 × 12–17μ, but not forming a hymenium-like layer. The stipe is minutely pruinose with simple, hyaline, thin-walled, cylindrical, downy hairs.

Leptonia lazulino-ardesiaca *Dennis*, sp. nov.

Pileus convexus, dein depressus, 5 mm. latus, 'Dark Blue-green-slate', e fibrilloso flocculoso squamulosus; caro inodora; lamellae subdistantes, adnexae, caesio-albidae, dein 'Pale Ecru Drab'; stipes centralis dein fere lateralis, concolor, aequalis, curvatis, 1 × 0·5 mm., basi strigosis; basidia tetraspora, 25 × 9μ, sporae 7–9 × 5–6μ, 6–8 angulatae. Fig. 125.

Hab. 1200 m., ad ramos putrescentes arborum frondosarum, Cortada del Guayabo, Miranda, 9.7.1958, *Dennis* 1153 (typus).

The hairs of the pileus are cylindrical, adpressed, with obtusely rounded tips, cells 40–45 × 8–12μ, with thin hyaline walls and blue-gray contents.

var. **brunnea** *Dennis*, var. nov.

A typo pileus brunneis recedit. *Dennis* 1153A (typus).

The blue and brown varieties of this fungus grew on the underside of fallen branches at the same locality and date and the status to be assigned to them depends on the importance one attaches to the distribution of pigment in agaric cells. The blue pigment of *Dennis* 1153 is clearly within the cell whereas the hairs and cuticular cells of *Dennis* 1153A have brown walls conspicuously encrusted on the outside with transverse bands of brown matter. On the other hand, in all characters other than pigmentation they are alike. The markedly excentric pilei would lead these fungi to be sought in *Claudopus* according to the artificial system of Fries but their affinities appear to lie with *Leptonia*. *Pleurotus lazulinus* Speg. differs in its subglobose spores, 7–10 × 7–8μ.

Leptonia sericella (Fr.) Barbier in Bul. Soc. mycol. France 27: 178 (1911).

Solitary, pileus 27 mm. diameter, convex, shading from Tilleul Buff at the low broad umbo to white at the margin, dry, silky, shining, not striate; flesh thin, concolorous; lamellae of 3 lengths, 5 mm. broad, adnate with a decurrent tooth, pale pink; stipe equal, 37 × 3 mm., smooth, white, hollow, brittle. Pileus-surface formed of broad parallel thin-walled hyphae; basidia 4-spored, 40 × 13μ, spores 9–12 × 7–8μ, mostly 6-angled.

About 3570 m., on wet soil under bushes, head of the valley S. of Laguna Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 25.7.1958, *Dennis & Buza* 1728.

var. **avilana** *Dennis*, var. nov.

A typo sporis 9–10 × 6–7μ, recedit. *Dennis* 1058 (typus).

Pileus 1·5 cm. diameter, convex with a broad shallow umbilicus, ivory white, silky, dry; flesh thin, white, smell not distinctive; lamellae moderately

spaced, of 3 lengths, 3 mm. wide, pale pink, adnate with a decurrent tooth; stipe slightly enlarged upwards, 25 × 2–3 mm., laterally compressed, fragile, fibrillose, hollow, white. Pileus-surface composed of parallel hyaline hyphae 10μ wide, with clamp connections; basidia 4-spored, 28–32 × 10–12μ, clamped, spores 9–10 × 6–7μ, 6–8-angled; cheilocystidia hyaline, cylindrical to ventricose, 75–100 × 10–15μ; similar but smaller hairs occur on the stipe. Fig. 126.

2000 m., on soil in cloud-forest, El Avila, Dto. Federal, 17.6.1958, *Dennis* 1058 (type).

This agrees with the umbilicate form of *L. sericella* in everything but its shorter spores. From *Entoloma aripoanum* Dennis and *E. cyathiformis* Dennis, of Trinidad, it differs in its hollow stipe and from the former also in growing on the ground. The habit and much larger cheilocystidia seem sufficiently to separate it from *E. bakeri* Dennis.

Fig. 126. *Leptonia sericella* var. *avilana*. Cheilocystidium, basidium and spores × 660.

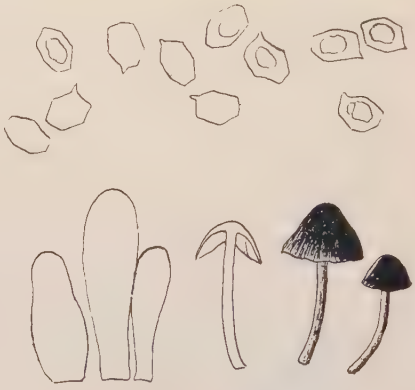


Fig. 127. *Leptonia venezuelana*. Spores and cheilocystidia × 660.

Leptonia serrulata (Pers. ex Fr.) Kummer, Fuhrer Pilzkunde: 96 (1871).

Solitary; pileus convex, flat or slightly depressed at the disc, 13 mm. diameter, Dusky Blue to Hortense Blue, dry, radiately sulcate; flesh thin, Light Tyrian Blue; lamellae rather close, of 3 lengths, Lilac Gray with Hortense Blue margin, adnate; stipe equal, 25 × 1 mm., concolorous with the pileus, base white, solid. Pileus-surface composed of parallel, thin-walled hyphae, 4–11μ wide, with blue-grey sap; spores 8–11 × 6–7μ, 6–7-angled; cheilocystidia vesicular, 20–25 × 9–10μ, with blue sap; smell none.

1300 m., on bare soil in a forested ravine, Los Guayabitos, Edo. Miranda, 8.6.1958, *Dennis & Foldats* 1002.

Both carpophore and spores are a trifle small as compared with European collections but in all other characters the agreement is so close I do not feel justified in proposing even a varietal name for the Venezuelan fungus.

Leptonia venezuelana *Dennis*, sp. nov.

Pileus campanulatus dein convexus, 12 mm. latus, nitidus, niger, glaber sed innato-radiato-fibrillosus; caro pallida, inodora; lamellae adnatae, 2 mm. latae, pallide incarnatae, acie nigra; stipes aequalis, 20 × 1–1·5 mm., glaber, nitidus, solidus, fumoso-olivascens vel caerulescens; basidia tetraspora, sporae 9–11 × 6–7μ, 6 angulatae; cheilocystidia vesiculosa, 24–40 × 7–14μ, caerulea. Fig. 127.

Hab. ad terram in silvis, El Junquito, Dto. Federal, 10.6.1958, *Dennis* 1031 (typus).

Pileus-surface covered with parallel hyphae, 6–10μ wide, with dark blue-grey contents.

Nolanea atripes *Dennis*, sp. nov.

Pileus submembranaceus, convexus, eximie papillatus, ad 1 cm. latus, fusco-umbrinus, 'Hair Brown', sericeus; caro concolor, odore subfarinaceo; lamellae ventricosae, 2·5 mm. latae, postice emarginatae, ex isabellino carneae; stipes aequalis, 40 × 1 mm., fusco-ater, glaber, politus; basidia tetraspora, 30 × 10μ, sporae 8–10·5 × 6–7 (–8)μ, 7 angulatae. Fig. 128.

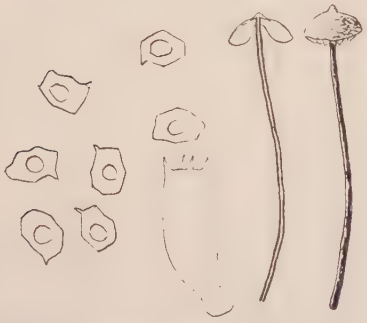


Fig. 128. *Nolanea atripes*. Spores and basidium × 660.

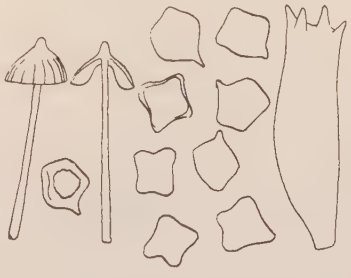


Fig. 129. *Nolanea avilana*. Spores and basidium × 660.

Hab. 900 m., ad terram in locis silvaticis, Caracas, Dto. Federal, 3.7.1958, *Dennis* 1133 (typus).

The contrast between the black stipe and light grey-brown pileus is very striking in the field and distinguishes the species from *N. papillata* Bres. From *N. juncea* (Fr.) Quél. sensu Lange it differs in its non-striate more papillate pileus.

Nolanea avilana *Dennis*, sp. nov.

Pileus submembranaceus, subcampanulatus, eximie papillatus, striatus, roseo-carneolus, 1 cm. latus; caro citrino; lamellae subconfertae, postice sinuato-adnatae, pallide cinnamomeae; stipes aequalis, solidus, glaber, 20 × 1 mm., apice citrinus, basi ochraceus; basidia tetraspora, 45× 13μ; sporae cubicae, 8–10μ. Fig. 129.

Hab. 2000 m., ad corticem muscosam arborum, El Avila, Dto. Federal, 17.8.1958, *Dennis* 1816 (typus).

Differs from *Rhodophyllus rhodellus* Romagn. in the smooth yellow stipe and ascending lamellae.

Nolanea dunstervillei *Dennis*, sp. nov.

Pileus submembranaceus, 12 mm. latus, campanulato-convexus, fuscus, sulcato-striatus, fibrillis liberis subfasciculatis obscurioribus eleganter ornatus; caro fuscidula, inodora; lamellae subdistantes, 2·5 mm. latae, adnatae, ex fuscidulis luride carneae; stipes aequalis, 35 × 1 mm., concolor, glaber; basidia tetraspora, 33 × 11μ, sporae 10–13 × 6–7μ, 7–8 angulatae. Fig. 130.

Hab. 900 m., ad terram graminosam, Caracas, Dto. Federal, 19.6.1958, *Dennis* 1067 (typus).

The squamules are composed of cohering multicellular hairs, up to 200 × 8–19μ, with brown walls lightly encrusted with brown pigment, without clamp connections. The tramal hyphae are similarly encrusted.

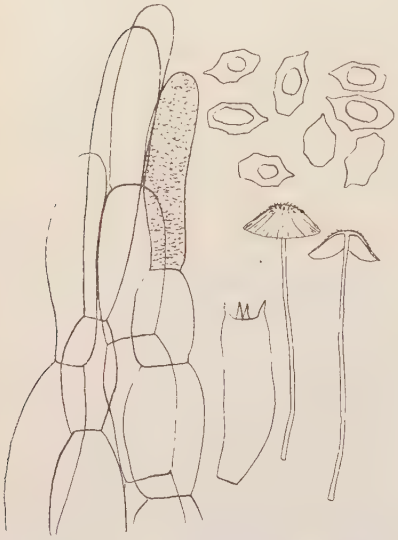


Fig. 130. *Nolanea dunstervillei*. Squamule hairs, spores and basidium × 660.

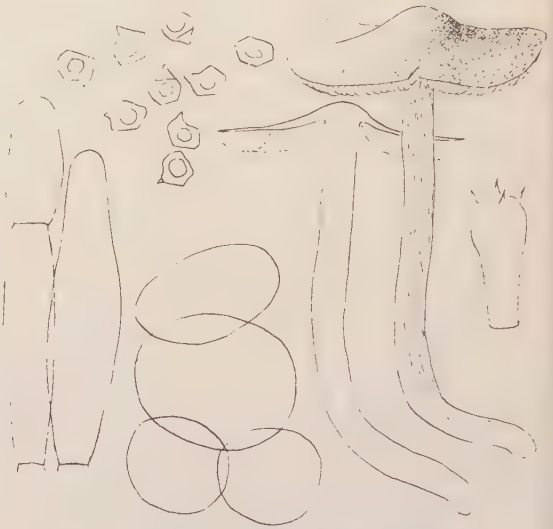


Fig. 131. *Nolanea foldatsii*. Cheilocystidia, spores, basidium and sphaerocysts × 660.

This species bears a marked resemblance to *N. babingtonii* (Bloxam) Sacc., from which it is distinguished by its smaller spores and smooth stipe. The latter character and the absence of cheilocystidia will separate it from *Rhodophyllus subnigrellus* Romagnesi, which also has slightly smaller spores, 9–10 × 6–6·5μ. *Entoloma naranjanum* Dennis differs in having cheilocystidia.

Nolanea foldatsii *Dennis*, sp. nov.

Pileus e campanulato expanso-umbonatus, 3 cm. latus, glaber sed in speciem puberulus dein dense et minute rimoso-squamulosus, badio-castaneus; caro alba, inodora; lamellae subconfertae, 3 mm. latae, emarginatae demum liberae, ex albis roseae, acie sub lente albo-dentata; stipes aequalis, 70 × 4 mm., longitudinaliter striatulus, albus, solidus; basidia tetraspora, sporae 6–8 × 5–6μ, 5–6-angulatae; cheilocystidia vesiculosa, 20–25 × 10μ. Fig. 131.

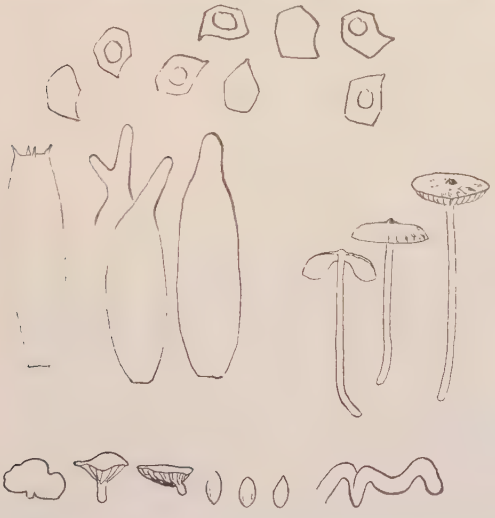
Hab. 1300 m., ad terram in silvis, Los Guayabitos, Miranda, 8.6.1958, *Dennis & Foldats* 1005 (typus); 1006.

The pileus-surface is covered with thin-walled subglobose cells, 15–30μ diameter, with grey-brown sap; the cheilocystidia are vesicular but in old specimens grow out into 2–3-celled, cylindrical, thin-walled, obtuse, hyaline hairs, up to 100 × 10μ. *N. foldatsii* closely resembles *Entoloma tucuchensis* Dennis, of Trinidad, from which it differs in its much smaller spores and pure white stipe.

Nolanea mammosa (L. ex Fr.) Quél. var. **venezuelana** *Dennis*, var. nov.

A var. *obsoleta* Romagnesi differt cystidiis 40–50 × 10–13μ.

Scattered; pileus up to 15 mm. diameter, conical, then expanded with a persistent papillate umbo, smooth, Buffy Brown, translucent and striate to the umbo; flesh thin, concolorous or greyish, hygrophanous, smell very faint, not of meal; lamellae rather crowded, of 3 lengths, ventricose, emarginate, pallid pinkish; stipe equal, up to 40 × 1·5 mm., slightly paler and greyer than the pileus, smooth and shining, stuffed, becoming hollow. Pileus-surface formed of radiating, parallel, grey-brown hyphae; basidia 4-spored, 30–40 × 10–11μ, spores 9–10 (–12) × 6–8 (—8·5)μ, 5–6 angled; cystidia scanty, mostly on the gill-edge but sometimes almost wanting, 40–50 × 10–13μ, with a single, short, obtuse beak, very rarely forked. Fig. 132.



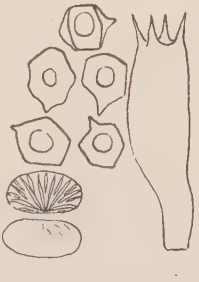


Fig. 132 (top left). *Nolanea mammosa* var. *venezuelana*. Spores, basidium and cheilocystidia × 660.

Fig. 133 (bottom left). *Clitopilus rhodotrama*. Spores and marginal hair × 660.

Fig. 134 (above). *Claudopus depluens* var. *macrosporus*. Spores and basidium × 660.

1300 m., on the ground in a forested ravine, Los Guayabitos, Edo. Miranda, 8.6.1958, *Dennis & Foldats* 1007; *Dennis* 1012 (type).

In *Dennis* 1012 a few cystidia occur on all gill-edges examined, in *Dennis & Foldats* 1007 they are more scanty but a few do occur. In shape they recall those of *Rhodophyllus campanulatus* Romagnesi but this is a species of different stature without a papillate umbo. In the complete absence of cystidia from a fruit-body it would be difficult to separate this Venezuelan fungus from *N. papillata* Bres.

Clitopilus rhodotrama Sing. in Lilloa 25: 421 (1952).

Gregarious; pileus up to 1 cm. diameter, flat or depressed, white, smooth, not striate, usually excentric with a lobed margin; flesh thin, white; stipe

usually very short and lateral, downy, white, becoming obsolete, occasionally central; lamellae moderately spaced, adnate, about 1 mm. wide and sometimes forked, coral pink, margin minutely fimbriate. Pileus-surface composed of rather loosely matted hyaline hyphae, 3–4μ wide, with small colourless rhomboidal crystals associated; gill-edge fringed with cylindrical, often undulating or slightly coiled, thin-walled, hyaline, obtuse hyphal tips, 4μ wide; spores elliptic-fusiform, 5–6·5 × 3μ, obscurely 8-angled in end view, pink in the mass; gill-trama coloured with pink intracellular pigment. Fig. 133, p. 153.

About 950 m., on soil at foot of tree in a garden, Los Palos Grandes, Edo. Miranda, 29.6.1958, *Dennis* 1122; 900 m., on debris in Botanic Garden, Caracas, Dto. Federal, 14.7.1958, *Dennis* 1122A.

Claudopus depluens (Batsch ex Fr.) Gillet, Hymenomycètes: 427 (1874) var. **macrosporus** *Dennis*, var. nov.

A typo sporis 11–13 × 8–9μ recedit.

Pileus sessile, applanate, white, 13 × 7 mm., smooth, dry; flesh thin, white; lamellae distant, of 2 lengths, pink; basidia 42 × 12μ, spores 6–7-angled. Fig. 134, p. 153.

3550 m., on *Espeletia*, Laguna Mucubaji, Sierra de Santo Domingo, Edo. Mérida, 23.7.1958, *Dennis & Buza* 2508 (typus).

According to Bresadola the spores of typical *C. depluens* measure 8–10 × 6–8μ, on basidia up to 30 × 9μ.

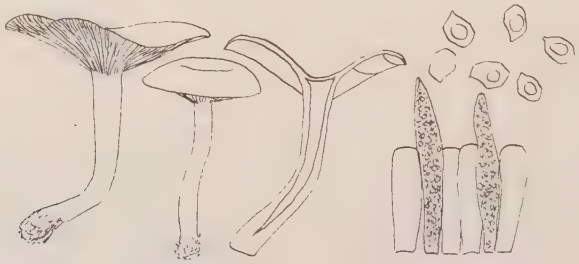


Fig. 135. *Rhodocybe caelatoïdea*. Spores, basidia and cystidia × 660.

Rhodocybe caelatoïdea *Dennis*, sp. nov.

Pileus e convexo-subumbilicato plano-depressus, ad 2·8 cm. latus, cinnamoneus, 'Pinkish Cinnamon' vel 'Cinnamon Buff', glaber, margine substriatus; caro alba, inodora; lamellae confertae, 2 mm. latae, 'Pinkish Cinnamon', adnato-decurrentes; stipes subaequalis, flexuosis, 20–25 × 2–3 mm., 'Cinnamon Buff', glaber, fistulosus, basi albo-floccosus. Basidia tetraspora, 20 × 6–7μ, sporae obovatae, 5–7·5 × 4–5μ, 6–7 angulatae, roseae; cystidia fusoideo-ventricosae, 25–35 × 4–6μ, rubro-brunnea, intus granuloso-farcta. Fig. 135.

Hab. 900 m., ad terram in silvis frondosis, Caracas, 30.6.1958, *Dennis* 1125 (typus); 3.7.1958, *Dennis* 1125A.

The pileus-surface consists of thin-walled hyphae 6–8μ wide, encrusted with brown matter. The distinctly angular spores are suggestive of an

Eccilia but the general air of the fungus is that of a *Clitocybe* and the cystidia closely resemble those of *Rhodocybe caelata* (Fr.) R. Maire, from which the present species differs in colouring and spore-shape.

Rhodocybe testacea *Dennis*, sp. nov.

Solitarius; pileus carnosus, e convexo-expansus, saepe undulato-repandus, testaceus, 'Hays Russet' vel 'Vinaceous Russet', glaber, 4·5 cm. latus; caro alba, sapore miti, odore grato in sicco; lamellae subconfertae, 4 mm. latae, decurrentes, fuligineae, 'Fawn color'; stipes aequalis, brevis, 15 × 6 mm., 'Vinaceous Pink', glaber, solidus. Basidia tetraspora, sporae subglobosae, subangulatae, 5–5·5 × 4–4·5μ. Fig. 136.

Hab. ad terram in silvis frondosis, Caracas, 11.7.1958, *Dennis* 1612 (typus).

Pileus-surface formed of subparallel hyphae 4–6μ wide, with thin smooth walls. There are no cystidia. Only a thin spore-print was obtained, not distinctly pink.

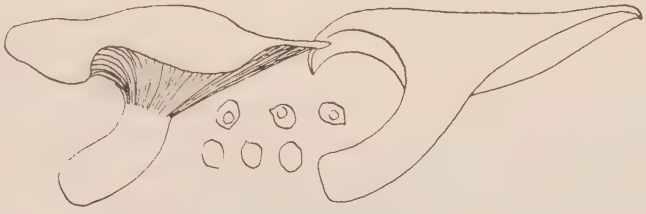


Fig. 136. *Rhodocybe testacea*. Spores × 660.

LEPTOTACEAE

Campanella alba (Berk. & Curt.) Sing. in Lloydia 8: 191 (1945).

1300 m., on dead wood in forested ravine, Los Guayabitos, Edo. Miranda, 8.6.1958, *Dennis & Foldats* 1164.

Singer suggested that *Laschia lamellosa* Pat., described from monocotyledonous stems on the left bank of the Orinoco above San Bartolo may be the same.

Arrhenia flabellula (Berk. & Curt.) Dennis in Kew Bull. 7: 327 (1952).

About 800 m., on dead wood, Guatopo forest, Edo. Miranda, 22.6.1958, *Dennis* 1186.

The type was one of Fendler's fungi, presumably from Colonia Tovar.

Favolaschia antarctica (Speg.) Sing. in Sydowia 9: 368 (1955).

3700 m., on dead log in forest between Laguna Negra and Laguna de los Patos, Sierra de Santo Domingo, Edo. Mérida, 31.7.1958, *Dennis* 1763.

Favolaschia cinnabarina (Berk. & Curt.) Pat., Essai taxonomique: 141 (1900).

1800 m., on twig in cloud-forest, El Junquito, Dto. Federal, 10.6.1958, *Dennis* 1029.

Favolaschia saccharina Pat. in Bull. Herb. Boiss. 3: 54 (1895).

1300 m., on stick in forested ravine, Los Guayabitos, Edo. Miranda, 8.6. 1958, *Dennis & Foldats* 1338; 2000 m., on herbaceous stem, forest of Sierra Nevada, La Mucuy, Edo. Mérida, 6.8.1958, *Dennis* 2538.

Favolaschia singeriana Dennis in Kew Bull. 7: 331 (1952).

Rancho Grande, Edo. Aragua, 19.11.1949, *Dennis* 95C.

Favolaschia gaillardii (Pat.) Pat. was originally described from Puero Perico in 1887 and Singer has also recorded from Venezuela *F. flava* (Bres.) Sing. and *F. sprucei* (Berk.) Sing. *Favolaschia magnifica* P. Henn. was described from Venezuela but to judge from the description it is very unlikely to belong to that genus, as indeed Hennings suspected.

A new botanical journal.—A warm welcome is to be given to a new botanical periodical called 'Kirkia', a separate of thirteen pages from the first volume of which has been recently received.

'Kirkia', whose subtitle is the 'Journal of the Federal Herbarium, Salisbury, Rhodesia and Nyasaland', is under the editorship of Dr. H. Wild and is intended to contain articles concerning African botany, with especial emphasis on papers on 'taxonomy, floristic studies, phytogeography and the history of botany and botanical exploration which have some bearing on the flora of the Federation'.

The journal takes its name from the distinguished administrator and botanist, Sir John Kirk, to whom we owe so much for his pioneer studies on the botany of East Africa, and who was both a warm friend and generous benefactor of Kew.

In this part of the first volume of 'Kirkia' there is a most interesting and appropriate article by the Editor on Kirk's life and work, and also a paper by Dr. H. Wild and Mr. R. B. Drummond on new *Vitaceae* from the Flora Zambesiaca area.

According to an explanatory note on the new journal, individual articles will be printed separately as soon as possible after approval by the Editor and a set sent to the author for distribution, after which, at the end of each year, the accumulated articles will be bound into a volume for sale. Since priority of publication is one of the main bases upon which the correctness of botanical names is judged, it is to be hoped that each volume will indicate the actual date of publication of each preprinted article.

It only remains to wish this new venture a happy and successful future.

J. P. M. Brenan

Miscellaneous notes on African species of *Crotalaria* L.: I

E. Milne-Redhead

The following notes, new combinations and new taxa are the result of revisional work on *Crotalaria* undertaken for the preparation of the 'Flora of Tropical East Africa'. The specimens quoted are all in the Herbarium of the Royal Botanic Gardens, Kew, unless otherwise indicated by the standard herbarium abbreviation in brackets following the citation. Where measurements and other characters are taken from specimens other than from the holotype, they are given in square brackets. The species dealt with in these notes are not arranged in any particular order, but an index to specific names mentioned will be found at the end (p. 167).

Crotalaria nigricans *Baker* in Oliv., Fl. Trop. Afr. 2: 21 (1871).

The many gatherings of this very distinct *Crotalaria* which are now at Kew reveal that there are two different forms of growth within the species. In one the shoots are prostrate, radiating from a central somewhat woody tap-root and resting on the ground, whilst in the other they are more or less erect forming a bushy plant up to 6 dm. high or even taller. No differences other than habit have been observed, but as this is so striking a character it has been decided to treat these growth-forms as varieties. Examination of the holotype, a specimen collected in April 1861 by Speke & Grant at Mininga [now in the Kahama District of Tanganyika about 90 km. NNW. of Tabora] shows it to be the prostrate variety, which will be known henceforth as var. **nigricans.**

C. nigricans *Baker* var. **erecta** *Milne-Redh.*, var. nov., a var. *nigricanti* habitu erecto vel suberecto caulibus usque 6 dm. altis distinguenda.

Tanganyika. Mwanza District. NW. Uzinza, Buchosa-Buganda Chiefdoms, in *Afrormosia* woodland, 1200 m., 12 June 1937, *B. D. Burtt* 6593 (holotype, K):—a common herb forming clumps. Uzinza, on Karumo to Geita road at Iwondo [probably Ibondo], rare in *Julbernardia globiflora* woodland, 1200 m., 31 Mar. 1937, *B. D. Burtt* 6525:—a bushy herb with yellow flowers. Urima, Buhunda, in cultivated ground on fine floury sandy soil, 1170 m., 6 May 1952, *Tanner* 736:—small squat bush, 6 dm. high; stems purple; flowers yellow.

It seems that var. *erecta* is less widely spread in Tanganyika than is var. *nigricans*. Both varieties occur in the Mwanza District, but the writer observed only var. *nigricans* (which is obviously less conspicuous than var. *erecta*) in the Songea, Iringa and Kondoa Districts during his visit to Tanganyika in 1956. An erect plant from Northern Rhodesia (Mwinilunga District, W. of R. Kasingiko, at edge of *Brachystegia* woodland, 5 Aug. 1930, *Milne-Redhead* 832) is up to 15 dm. tall, has few rather larger flowers and larger leaflets, and in consequence may be varietally different from var. *erecta*. More material is needed before a definite decision on this plant can be made.

Crotalaria axillaris *Ait.*, Hort. Kew. 3: 20 (1789).

This species is widely spread in East Africa and occurs over a very large altitudinal range, from sea level up to over 2,200 m. The available material shows considerable variation in indumentum and in size of flowers and fruits. Plants from near the coast usually have a short adpressed indumentum on the lower leaf-surface while those from the highlands have longer curly hairs. There does not appear to be any correlation between this and other variable characters and in consequence it is not thought advisable to describe any infraspecific taxa. Among the abundant material at Kew were some specimens which appeared to be distinct from *C. axillaris*, and these included an excellent gathering made by Drummond & Hemsley on the Colonial Office Expedition of 1953–4. This is described as a new species below, and is named after Mr. R. B. Drummond, whose joint collection with Mr. J. H. Hemsley is of such an outstanding quality.

Crotalaria drummondii *Milne-Redh.*, sp. nov. *C. axillari* Ait. affinis, sed foliolis subtus dense et adpresse argenteo-pubescentibus, apice retusis vel emarginatis, fructu majore breviore stipitato differt.

Herba fruticosa usque 2·5 m. alta. *Caules* dense adpresse pubescentes. *Folia* petiolata, trifoliolata, usque 11 [–16] cm. longa; petiolus dense adpresse pubescens, usque 5·5 [–10·5] cm. longus; foliola elliptico-obovata, apice restusa vel emarginata, basi cuneata, usque 53 [–55] mm. longa et 31 mm. lata, supra glabra, subtus dense adpresse argenteo-pubescentia; costa supra leviter sulcata, subtus prominula; nervi laterales circiter 7, inconspicui; stipulae minutae, mox deciduae. *Inflorescentiae* brevissime racemosae vel subfasciculatae, axillares, usque 4-florae; bracteae lineares, usque 1·5 mm. longae, inconspicuae; pedicelli circiter 10 mm. longi, bracteolis binis minutissimis basin versus instructi. *Calyx* 5-lobatus, extra dense adpresse pubescens, intus glaber; tubus late obconicus, circiter 4 mm. longus; lobi anguste deltoidei, circiter 10 mm. longi, tandem patentes vel reflexi. *Vexillum* suborbiculare, apice leviter retusum, basi in unguem brevem crassum contractum, circiter 25 mm. longum et 22 mm. latum, intus supra unguem appendicibus binis carnosis instructum, extra lineam mediam versus parce adpresse pubescens, ceterum glabrum; alae obovato-oblongae, 21 mm. longae, 10 mm. latae, ungue 4 mm. longo instructae; carina infra medium rotundata, apicem versus longiuscule rostrata, rostro tortili leviter incurvo, basi unguem 3 mm. longum instructa, circiter 21 mm. longa* et 10 mm. lata. *Stamina* fertilia antheris linearibus 4 mm. longis instructa; stamina abortiva antheris suborbiculatis 0·5 mm. diametro glabris instructa. *Ovarium* circiter 9 mm. longum, minute adpresse pubescens, circiter 16-ovulatum; stylus circiter 17 mm. longus, superne postice breviter pubescens. *Legumen* late subcylindricum, apice plus minusve truncatum, basi in stipitem brevem angustatum, usque 6·5 cm. longum et 2·8 cm. latum, parce et minute pubescens; semina circiter 16, 6 mm. diametro, levia, pallide flavo-brunnea.

Kenya. Machakos District. Emali Hill, at forest edge, 1500 m., 22 Mar. 1940 (fl.), *van Someren* 173 (*C.M.* 16537) (EA, K); Makueni-Emali, 9–1200 m., 11 Jan. 1950, *Morna Hale* 94. Kisumu District. Kisumu, 990 m., *Dawson*

* Throughout this paper the length of the keel is measured from the base of the claw to the apex of the beak.

443; Kisumu, 11 July 1920, *Shantz* 890:—plant spreading, 4·5–9·0 dm. high, pod very large. Kisumu, on black loam, 1200 m., Mar. 1926, *McDonald* 1078; Kisumu, on rocky slope above Lake Victoria, 1140 m., May 1958, *Tweedie* 1550:—common herbaceous plant, branching to 10·5 dm. high; flowers golden yellow turning brown when going over, opening after noon. Same locality, habitat & altitude, Mar. 1959, *Tweedie* 1802. Kwale District. Near Taru between Samburu and Mackinnon Road, at sandy margin of pool in depression in large rock-outcrop, 350 m., 3 Sept. 1953, *Drummond & Hemsley* 4148 (K, holotype):—erect shrub, 2·5 m. high; calyx green; standard and wings bright yellow; keel greenish-yellow; pods inflated, pale green. Lamu District. Kiunga Islands, 1951, *Oxford University Expedition* L.7.

C. drummondi occupies rather drier regions than does *C. axillaris*, and at present is known only from Kenya.

Crotalaria incana *L.*, Sp. Pl.: 716 (1753).

The species was described from West Indian material. The common African plant differs from this in having long yellow-brown spreading hairs on the stem, leaflets with scattered hairs below, stipules up to 10 mm. long and the calyx beset with long yellow-brown spreading hairs. This plant has been described as a distinct species under the name *C. purpurascens* Lam., and again as *C. schimperi* A. Rich., but most authors have failed to distinguish it by name from typical *C. incana*, which incidentally does occur apparently spontaneously in tropical Africa. Confusion has been increased by Wilczek (Fl. Congo Belge et Ruanda-Urundi 4: 148 (1953)) treating the plant with spreading yellow-brown hairs as typical *C. incana*, and describing as forma *glabrescens* a taxon which is indistinguishable from typical *C. incana*.

The writer considers that the common African plant should be treated as a subspecies of *C. incana* and the necessary new combination accompanied by a short Latin diagnosis follows.

C. incana *L.* subsp. **purpurascens** (*Lam.*) *Milne-Redh.*, subsp. et comb. nov., a subsp. *incana* caulibus pilis longis flavo-brunneis indutis, foliolis subtus parce hirsutis, stipulis usque 10 mm. longis et calyce pilis flavo-brunneis patentibus praedito differt.

C. purpurascens Lam., Encycl. 2: 200 (1786). Type: a plant cultivated in Paris, said to grow in Madagascar and Mauritius. This plant does not appear to have been preserved.

C. schimperi A. Rich., Tent. Fl. Abyss. 1: 151 (1847). Type: from Ethiopia, Tigre, Adoua, *Schimper* 394 (P, syntype).

Crotalaria shirensis (*Bak. f.*) *Milne-Redh.*, sp. and stat. nov., a *C. minutissima* Bak. f. foliis longioribus et latioribus, floribus majoribus, binis vel raro ternis, seminibus minoribus levibus differt.

C. bongensis Bak. f. var. *shirensis* Bak. f. in Journ. Linn. Soc., Bot. 42: 256 (1914); Verdoorn in Bothalia 2: 415 (1928).

Herba annua, usque 3 [–3·9] dm. alta, parce vel interdum dense furcata. *Caules* erecti vel adscendentes, pilis adpressis vel patentibus parce induti. *Folia* simplicia, subsessilia; lamina anguste elliptica vel lineari-oblonga, apice

acuta, basi in petiolum minutum attenuata, usque 48 [·58] mm. longa et 3 mm. lata vel 44 mm. longa et 9 mm. lata, supra glabra, subtus parce adpresse vel patente pubescentia. *Stipulae* lineari-subulatae, usque 3 mm. longae. *Inflorescentiae* terminales, foliolis oppositae, racemosae, 1–3-florae, cum pedunculo usque 4 cm. longo usque 6 cm. longae; pedunculus, rhachis et pedicelli parce adpresse vel patente pubescentes; bracteae minutae, persistentes; bracteolae basin versus calycis ortae, minutissimae. *Calyx* 5-dentatus, extra parce subadpresse vel patente pubescens, intus glaber; tubus late obconicus, usque 1·3 mm. longus; dentes anguste deltoidei. *Vexillum* late ellipticum, apice rotundatum, basi in unguem abrupte contractum, circiter 6·5 mm. longum et 5 mm. latum, glabrum; alae oblongae, cum ungue 5 mm. longae; carina infra medium rectangulari-angulata, apicem versus in rostrum prorsum curvatum producta, 6 mm. longa. *Stamina* fertilia antheris 0·8 mm. longis instructa; stamina abortiva antheris valde redactis minutissimis instructa. *Ovarium* circiter 3 mm. longum, dense pubescens, usque 25-ovulatum. *Legumen* sessile, cylindricum, usque 13 mm. longum et 2 mm. diametro, parce adpresse pilosum, usque 20-spermum; semina oblique cordiformia, compressa, circiter 1 mm. diametro, rubro-brunnea, levia.

Tanganyika. Buha District. Kasulu, Heru Chini, in dry red loam, 1350 m., 20 Apr. 1931, *Rounce* 45 (EA, K). Ufipa District. Between Ilemba and Kasamvu, among rocks in the *Brachystegia* woodland of the scarp, 1200–1500 m., 21 Mar. 1950, *Bullock* 2684; Ilemba Gap on road to L. Rukwa, on sandy roadside verge, 1500 m., 12 Mar. 1959, *Richards* 11190, 11191. Mbeya District. Without locality, 1650 m., 23 Mar. 1932, *R. M. Davies* 88 (EA, K); Mbeya, 1650 m., 3 Mar. 1932, *R. M. Davies* 454 (EA, K); Mbeya Airfield, in induced grassland, 1650 m., 11 May 1956, *Milne-Redhead & Taylor* 10161. Rungwe District. Kibila River near Kyimbila, 9 May 1913, *Stolz* 1989 (EA, K). Songea District. Unangwa Hill just E. of Songea, among grass in stony soil on slope near rock-outcrop in *Brachystegia* woodland, 1150 m., 22 Mar. 1956, *Milne-Redhead & Taylor* 9328; about 1·5 km. W. of Ruanda turn-off W. of Songea, in *Brachystegia-Uapaca* woodland on red loam, 875 m., 10 Apr. 1956, *Milne-Redhead & Taylor* 9500. Tunduru District. Tunduru to Songea road just E. of Songea District boundary, weed by roadside in gravel and sand in *Brachystegia-Uapaca* woodland, 900 m., 5 June 1956, *Milne-Redhead & Taylor* 10623.

Nyasaland. Blantyre District. Shire Highlands, *Buchanan* 57 (K, holotype); Blantyre, in pastureland, 1050 m., 6 Apr. 1937, *Lawrence* 357.

Southern Rhodesia. Salisbury District. Chindamora Reserve, Ngoma Kurira, on granite whale-back in damp ground, 1650 m., 28 Mar. 1952, *Wild* 3776 *in Gov. Herb.* 35992 (K, SRGH).

Northern Rhodesia. Kawamba District. Between Nchelingi and Mulungu, in sandy soil by roadside, 23 Apr. 1957, *Richards* 9410. Abercorn District. Isoko Valley near Abercorn, in sandy soil by path, 1200 m., 17 Mar. 1952, *Richards* 1075; old Road to Pans near Abercorn, by roadside in red sandy soil, 1500 m., 1 Mar. 1955, *Richards* 4726; Abercorn, a common ruderal in *Brachystegia* woodland, 1650 m., 29 Mar. 1950, *Bullock* 2749; Kawimbe, on open ground, 1500 m., 6 Apr. 1959, *McCallum-Webster* 703; Chilongowelo, on sandy roadside verge, 1140 m., 7 Apr. 1959, *McCallum-Webster* 750; on track to Iruna Village, near Kawimbe, in dry short grass-

land, 1740 m., 18 Apr. 1959, *Richards* 11271; Chisungu, in sandy lateritic soil by side of track, 1440 m., 20 Apr. 1959, *Richards* 11293. Central Province. About 13 km. E. of Lusaka, in open spaces in short grass, 1260 m., 2 Mar. 1956, *King* 333. Western Province. Chingola, on dry sandy ground, 1300 m., 17 Mar. 1960, *Robinson* 3415.

The writer is unable to agree with E. G. Baker in treating this taxon as a variety of *C. bongensis* Bak. f., a species which differs in a number of characters the most important perhaps being the presence of petioles to the unifoliolate leaves. *C. shirensis* undoubtedly is very closely allied to *C. minutissima* Bak. f., and also to *C. teretifolia* Milne-Redh., which latter species occupies part of the same geographical area as *C. shirensis* and sometimes grows nearby it, resulting in the collection of mixed gatherings, yet these two species remain clearly distinct.

Crotalaria teretifolia *Milne-Redh.*, sp. nov. *C. shirensi* (Bak. f.) Milne-Redh. valde affinis, sed foliis teretibus, calyce subglabro, legumine breviore, seminibus paucioribus facile distinguenda.

Herba annua, usque 20 [–27] cm. alta, parce furcata. *Caules* erecti, glabri. *Folia* simplicia, subsessilia; lamina teres, supra longitudinaliter canaliculata, apice acuta, basi in petiolum minutum angustata, usque 35 [–40] mm. longa, 0·4 mm. lata, pilis paucis brevibus adpressis praedita. *Stipulae* linearisubulatae, usque 1 mm. longae. *Inflorescentiae* terminales, foliis oppositae, racemosae, 1–3-florae, cum pedunculo usque 28 mm. longo usque 44 mm. longae; pedunculus, rhachis et pedicelli glabri vel subglabri; bracteae minutae, persistentes; bracteolae basin versus calycem ortae, minutissimae. *Calyx* 5-dentatus, extra parcissime adpresse pubescens, intus glaber; tubus late obconicus, usque 1·2 mm. longus; dentes anguste deltoidei, usque 1·2 mm. longi. *Vexillum* late ellipticum, apice rotundatum, basi in unguem abrupte contractum, usque 6·5 mm. longum et 5 mm. latum, glabrum; alae oblongae, cum ungue 4 mm. longae; carina infra medium rectangulariangulata, apicem versus in rostrum prorsum curvatum producta, vix 6 mm. longa. *Stamina* fertilia antheris 0·6 mm. longis instructa; stamina abortiva antheris valde redactis minutissimis instructa. *Ovarium* circiter 1·5 mm. longum, dense pubescens, circiter 16-ovulatum. [*Legumen* sessile, cylindricum, usque 8 mm. longum et 2 mm. diametro, parce adpresse pilosum, usque 14-spermum; semina oblique cordiformia, compressa, usque 1·2 mm. diametro, rubro-brunnea, inconspicue rugosa.]

Congo Republic. Haut-Katanga. Upembe National Park, northern spur of Mount Kia, near Biamalwa, in rocky woodland, 1050 m., 28 Feb. 1949, *Van Mul* 05625 (BR). Keyberg, 7 km. SE. of Elisabethville, on lateritic gravel, 14 Mar. 1947, *Schmitz* 309 (BR).

Tanganyika. Ufipa District. Ilemba Gap on road to L. Rukwa, on sandy roadside verge, 1500 m., 12 Mar. 1959, *Richards* 11189. Mbeya District. Mbeya Airfield, in induced grassland with *C. shirensis*, 11 May 1956, *Milne-Redhead & Taylor* 10156. Songea District. Unangwa Hill just E. of Songea, in rather bare soil near rock outcrop in *Brachystegia* woodland, 22 Mar. 1956, *Milne-Redhead & Taylor* 9327; Chandamara Hill just NE. of Songea, on gravel soil near exposed rock in open, 23 Mar. 1956, *Milne-Redhead & Taylor* 9327A (K, holotype, BR, EA, isotypes); Litenga Hill about 43 km. W.

of Songea, in small pockets of soil on exposed rock, 19 Apr. 1956, *Milne-Redhead & Taylor* 9327B.

Northern Rhodesia. Abercorn District. Hill by road to Nkali dambo, on yellow sandy soil among rocks, 4 Apr. 1955, *Richards* 5300; Abercorn, by road to St. Paul's Mission, in sandy ground with *C. shirensis*, 9 Mar. 1955, *Richards* 4843; Abercorn, near Simanwe, in dry sand by road, 3 May 1957, *Richards* 9524; Abercorn Pans, in damp sand among flat ironstone rocks, 26 Mar. 1957, *Richards* 8873; without locality, 10 June 1957, *Richards* s.n.

This species is closely related to *C. shirensis* (Bak. f.) Milne-Redh. from which it can readily be distinguished by its consistently terete leaves. From *C. minutissima* Bak. f. it is separated by the larger flowers, terete leaves and smaller more numerous seeds.

Crotalaria mesopontica *Taub.* in Engl., Pflanzenw. Ost-Afr. C: 207 (1895).

In the 'Flore du Congo Belge et du Ruanda-Urundi', Wilczek recognizes a forma *glabrescens*, based on a gathering from Mt. Muhavura (*Humbert* 8534). He cites two other specimens, one from Mt. Karisimbi and the other from Elisabethville. *C. mesopontica* is well represented at Kew, where an examination of the available material shows that forma *glabrescens* R. Wilcz., with glabrous upper surface to the leaves, is the taxon occuring at altitudes above 2400 m., whilst typical *C. mesopontica* is found between 1150 m. and 2250 m. In view of this, the specimen from Elisabethville (*Salésiens* 468) was, through the kindness of Prof. W. Robyns, examined, and found to belong to another species. It seems, therefore, that forma *glabrescens* should be raised in rank to subspecies, seeing that it occupies a higher altitudinal zone to the exclusion of typical *C. mesopontica*. The writer accordingly makes the necessary combination, and cites the specimens which he has examined.

Crotalaria mesopontica *Taub.* subsp. **glabrescens** (*R. Wilcz.*) *Milne-Redh.*, stat. et comb. nov.

C. mesopontica Taub. forma *glabrescens* R. Wilcz. in Bull. Jard. Bot. Brux. 23: 151 (1853); Fl. Congo Belge 4: 172 (1953).

Ruanda-Urundi. Mt. Muhavura, 2650–3200 m., June 1929, *Humbert* 8534 (BR, holotype).

Uganda. Kigezi District. Mt. Muhavura, 3000 m., 17 Nov. 1934, *G. Taylor* 1741 (BM); between Mt. Mgahinga and Mt. Sabinio, 2550 m., 21 Nov. 1934, *G. Taylor* 1856 (BM); Mt. Mgahinga, 2550 m., June 1951, *Purseglove* 3712.

Crotalaria oöcarpa *Baker* (in Bull. Misc. Inf. Kew 1897: 252 (1897)) occupies two distinct climatic and geographical regions in East Africa and also occurs in Ruanda-Urundi. It was originally described from a specimen from Nyasaland and has been collected several times in the Southern Highlands of Tanganyika. It also is found in the lower rainfall areas of the Mbulu, Masai and Arusha Districts of Tanganyika and possibly in the Masai District of Kenya. This northern dry-country plant differs slightly but constantly from typical *C. oöcarpa*, and it is considered best treated as a subspecies, which can be recognized when in fruit by the diagnostic characters given below.

Crotalaria oöcarpa *Baker* subsp. **microcarpa** *Milne-Redh.*, subsp. nov., a subsp. *oöcarpa* legumine usque 9 mm. (haud 12 mm.) longo, pro portione angustiori, densiuscule sub adpresse piloso (haud patenter pilosa) differt.

? *C. africana* Buscal. & Muschl. in Engl., Bot. Jahrb. 49: 470 (1913).

Kenya. Masai District. Guaso Nyiro, *Aosta* 1602 (holotype of *C. africana* at B, now destroyed).

Tanganyika. Masai District. Plains W. of Manjara Escarpment, in open grassland, 1440 m., 1 Jan. 1956, *Bally* 10611 (EA, K); by road from Manyara to Arusha, 25 June 1936, *Staples* 388 (K, holotype, EA, isotype). Mbulu District. Mbulumbul, in derelict arable ground, 1530 m., 23 June 1944; Oldeani, in upland grassland, 21 June 1935, *R. M. Davies* 1079 (EA, K) and 1200 m., 11 Aug. 1952, *Tanner* 854; about 8 km. N. of Karatu, in upland grassland, 25 June 1938, *Pole Evans & Erens* 1003. Arusha District. Lengidjawe [Lengijawe], 13 July 1926, *Peter* 42627 (B, K).

Crotalaria pilosiflora *Baker* in Bull. Misc. Inf. Kew 1897: 251 (1897).

This species has been reduced to the synonymy of *C. oöcarpa* both by E. G. Baker in Journ. Linn. Soc., Bot. 42: 339 (1914) and by I. C. Verdoorn in Bothalia 2: 408 (1928). The writer cannot agree with this, and considers *C. pilosiflora* a distinct but closely related species, differing in the shape of the leaflets and in their being glabrous on the upper surface.

Crotalaria simulans *Milne-Redh.*, sp. nov. *C. saxatili* Vatke affinis, sed foliolis densius adpresse argento-pilosis pilis utrinque aequilongis, bracteolis medium versus pedicellum ortis facile distinguenda.

Frutex usque 1·8 [–3] m. altus. *Caules* juveniles adpresse argenteo-pubescentes, vetustiores glabrescentes epidermi papyraceo exfoliante lenticillis in seriebus longitudinalibus e cortice viridulo exortis. *Folia* petiolata, trifoliolata, usque 7 cm. longa; petiolus densiuscule adpresse pubescens, usque 2·8 cm. longus; foliola elliptica vel interdum ovata vel obovata, apice rotundata et minutissime apiculata, basi rotundata, usque 4·2 cm. lata, adpresse argenteo-pilosa, pilis utrinque aequilongis; costa supra sulcata, subtus prominula; nervi laterales 3–4, inconspicui; stipulae filiformes, pubescentes, usque 4 mm. longae, inconspicuae. *Inflorescentia* terminalis, racemosa, usque 20-flora et 18 cm. longa; pedunculus usque 1·5 cm. longus; bracteae usque 6 mm. longae, filiformes, pubescentes, patentes, caducae; pedicelli circiter 8 mm. longi, bracteolis binis usque 5 mm. longis filiformibus medium versus instructi. *Calyx* 5-lobatus, adpresse pubescens; tubus latissime obconicus, circiter 4 mm. longus; lobi anguste deltoideis, acuti, circiter 7 mm. longi, tandum patentes. *Vexillum* suborbiculare, apice leviter retusum, basi in unguem brevem carnosum contractum, circiter 23 mm. longum et latum, intus supra unguem appendicibus binis carnosis instructum, argenteo-pubescens, ceterum glabrum; alae obovato-oblongae, 15 mm. longae, 6 mm. latae, ungue 4 mm. longo instructae, laminae postice basi minute pubescentes, ceterum glabrae; carina medium versus rotundata, apicem versus rostrata, rostro haud tortili leviter incurvo, basi unguem 3 mm. longum instructa, circiter 12 mm. longa et 7 mm. lata, inferne ad margines dense et breviter lanata, medium versus lateraliter inflata. *Stamina* fertilia antheris linearibus 2 mm. longis

instructa; stamina abortiva antheris breviter ovoideis 0·8 mm. longis glabris instructa. *Ovarium* circiter 7 mm. longum, minute adpresse pubescens, circiter 3 mm. longe stipitatum, circiter 20-ovulatum, antice disco carnoso deltoideo 3 mm. longo instructum; stylus circiter 8 mm. longus, superne pubescens. *Legumen* immaturum subcylindricum, apicem versus sensim dilatatum sed apice abrupte contractum, basi breviter stipitatum, circiter 4 cm. longum et 1 cm. diametro, parce adpresse pubescens; semina ignota.

Tanganyika. Dodoma District. About 8 km. S. of Dodoma, in *Acacia-Capparidaceae* desert bushland by Great North Road, 1230 m., 19 July 1956, *Milne-Redhead & Taylor* 11251 (K, holotype, B, BR, EA, LISC, isotypes). Mpwapwa District. Mpwapwa, 23 Jan. 1929, *Hornby* 65; Mpwapwa, in deciduous thicket, 1140 m., 13 June 1938, *Hornby* 65A; Mpwapwa, *Hornby* 870A (in spirit).

This species has in the past been confused with the widely spread *C. saxatilis* Vatke, largely on the basis of somewhat untypical out-of-season specimens from Mpwapwa. In 1956, the writer was lucky to find a single specimen in good flowering condition by a dried-up water-course near Dodoma at a season when the vegetation in general was resting in dry very hot weather. A second plant, away from the water-course, was almost leafless and had only a few flowers and one unripe fruit in a fit state to collect. The ripe fruit and seed are still unknown to him.

C. simulans is a good example of a local species which is closely allied to a comparatively common species. Both species occur near Mpwapwa, but whilst *C. simulans* inhabits the drier, thicket vegetation, *C. saxatilis* is found in the more favourable climate of the hills, where it grows at 'forest margins'. *C. saxatilis* is found in the Kenya highlands, throughout eastern Tanganyika, and south to near Lourenço Marques.

Crotalaria hemsleyi *Milne-Redh.*, sp. nov. *C. emarginato* valde affinis, sed caulibus piliis longioribus indutis, foliolis ellipticis acutis et apiculatis vel interdum rotundatis usque 50 mm. longis, carina usque 13 mm. longa differt.

Herba annua vel perennis usque 12 dm. alta. *Caules* simplices vel superne furcati, dense hirsuti, sulcati. *Folia* petiolata, trifoliolata, usque 7·5 cm. longa; petiolus usque 2·8 cm. longus, dense hirsutus; foliola elliptica, apice acuta et apiculata, interdum rotundata, haud emarginata, basi cuneata usque 5·0 cm. longa et 2·0 cm. lata, supra breviter et densiuscule pilosa, subtus parce et longius pilosa; costa supra leviter sulcata, subtus prominula, densiuscule pilosa; nervi laterales circiter 7, subtus pilosi; stipulae minutissimae. *Inflorescentiae* racemosae, terminales, multiflorae, usque 20 cm. longae; pedunculus 2·5–6·0 cm. longus; bracteae circiter 1·5 mm. longae, deflexae, persistentes; pedicelli usque 5 mm. longi, hirsuti; bracteolae apice pedicelli ortae, circiter 2 mm. longae, lineari-filiformes, mox deciduae. *Calyx* 5-lobatus, extra pilis patentibus densiuscule pubescens, intus glaber; tubus breviter cylindricus, basi abrupte contractus, circiter 3·0 mm. longus; lobi deltoidei apice attenuati, usque 3·5 mm. longi. *Vexillum* suborbiculare, apice rotundatum, basi in unguem brevem crassum intus tomentosum contractum, aliter glabrum, circiter 9 mm. longum et 8 mm. latum, intus ad apicem unguis appendicibus binis brevissimis carnosis instructum; alae oblongae, 13 mm. longae, 4 mm. latae, ungue 3 mm. longo curvato in-

structae; carina medium versus rotundata, apicem versus valde rostrata, rostro leviter incurvo haud tortili, basi ungue 3 mm. longo instructa, usque 13 mm. longa et 5 mm. lata. *Stamina* fertilia antheris elongatis 2 mm. longis instructa; stamina abortiva antheris suborbiculatis 0·8 mm. diametro glabris instructa. *Ovarium* breviter stipitatum, circiter 4 mm. longum, postice apicem versus dense breviter hirsutum, ceterum glabrum, circiter 34-ovulatum; stylus circiter 10 cm. longus, postice superne dense et minute hirsutus, ceterum glaber. *Legumen* subcylindrum, sessile, usque 2·5 cm. longum et 6 mm. latum, tomentosum; semina circiter 30, 2·8 mm. diametro, levia, rubro-brunnea.

TANGANYIKA. Morogoro District. Uluguru Mts., Mgeta River valley above Bunduki, in secondary bushland and old cultivated land, 1350 m., 12 Mar. 1953, *Drummond & Hemsley* 1506 (K, holotype):—erect to 1·5 m.; standard and wings bright yellow; keel with dark maroon areas at base and apex and lines in between over pale yellow ground colour; Uluguru Mts., 1500 m., among bracken [*Pteridium*], 11 Oct. 1935, *Rounce* 505; Uluguru Mts., Bunduki, occasional by riverside, 1200 m., 20 Jan. 1935, *E. M. Bruce* 648 (BM, K):—shrub 1·2 m. high; flowers yellow; keel streaked with red.

C. hemsleyi is known only from the Uluguru Mts. where it occurs at altitudes of from 1200 m. to 1500 m. It is most closely allied to *C. emarginata* Benth. which is a lowland species with a wide distribution along the coast of East Africa. It is named after Mr. J. H. Hemsley who with Mr. R. B. Drummond made a very fine collection of East African plants.

Crotalaria miranda *Milne-Redh.*, sp. nov. *C. lugardiorum* Bullock valde affinis, sed foliis supra parce adpresse pubescentibus, caulibus et foliis pilis medifixis instructis, floribus leviter majoribus, seminibus majoribus griseo- vel brunneo-viridibus differt.

Herba annua usque 6 dm. alta. *Caulis* basin versus ramosus; rami adscendentes, obscure sulcati, pilis brevibus planis medifixis instructi. *Folia* simplicia, subsessilia; lamina anguste elliptica vel interdum fere linearia, apice acuta vel rotundata, apiculata, basi cuneata, usque 90 mm. longa et 5 mm. lata vel 50 mm. longa et 9 mm. lata, utrinque pilis medifixis parce adpresse pubescentia; petiolulus usque 3 mm. longus, densiuscule et similiter pubescens. *Stipulae* usque 2 mm. longae, subulatae. *Inflorescentiae* racemosae, terminales, cum pedunculo usque 5·5 cm. longo usque 28 cm. longae, usque 26-florae, laxiusculae; pedunculus, rhachis et pedicelli adpresse pubescentes; bracteae filiformes, usque 3 mm. longae, persistentes; bracteolae basi calycis ortae, circiter 1·5 mm. longae, inconspicuae. *Calyx* infundibuliformis, 5-labatus, extra pilis brevibus adpressis basi brunneis densiuscule indutus, intus glaber; tubus 2 mm. longus; lobi usque 5 mm. longus, anguste triangulares, acuti. *Vexillum* obovatum, apice rotundatum, basin versus late cuneatum, 14 [–18] mm. longum, 9·5 mm. latum, luteum extra brunneo-lineatum, extra superne et medium versus pilis minutis adpressis basi brunneis indutum; alae oblongae ungue 1 mm. longo instructae, in toto 11 mm. longae, luteae; carina basin versus rectangulari-angulata, apicem versus in rostrum longum rectum vix tortilem prolata, 13 mm. longa, 5 mm. lata, pallide lutea. *Stamina* fertilia antheris linearibus 2 mm. longis instructa; stamina abortiva antheris subglobosis 0·5 mm. diametro glabris instructa. *Ovarium* circiter 5 mm. longum, vix stipitatum, adpresse pubescens, [circiter 24-ovulatum]; stylus

8 mm. longus, superne pubescens. *Legumen* subcylindricum, basin versus angustatum, subsessile, 24–28 mm. longum, 5 mm. latum, pilis brevibus basi brunneis adpressis indutum; [semina oblique-cordata, usque 1·8 mm. diametro, levia, griseo- vel brunneo-viridia, immaculata].

Tanganyika. Buha District. Kasulu, Heru Chini, on stony hillsides on red clay, 1350 m., 1 April 1931, *Rounce* 32 (EA, K):—upright herb, sometimes woody below; flowers yellow. Mbeya District. Without locality, 1650 m., 23 Mar. 1932, *R. M. Davies* 90 (EA, K):—common herb; flowers yellow; Mbosi, 1680 m., 24 Feb. 1932, *R. M. Davies* 102 (EA, K):—common herb; flowers yellow.

Northern Rhodesia. Abercorn District. Road from Abercorn to Nkali Dambo, roadside among grass, on yellow soil, 1500 m., 4 April 1955, *Richards* 5283:—annual 60 cm. high; leaves with very small hairs; standard long, narrow, brown; wings small, tinged brown; keel pale yellow, very pointed. Same locality and habitat, 1740 m., 7 Apr. 1959, *Richards* 11201:—flowers yellow. About 1·5 km. from Ndundu on Kawimbe road, on roadside verge, 1680 m., 22 Apr. 1959, *McCallum-Webster* 870 (K, holotype):—erect slender annual to 75 cm. high; leaves linear; flowers yellow with orange veins outside, rather large. Same locality, 1740 m., 2 May 1959, *Richards* 11364:—fruiting material of plant already collected. Itembwe Gorge, in woodland in dense vegetation, one plant only, 1650 m., 24 April 1959, *Richards* 11338:—annual; standard yellow.

Clearly closely allied to *C. lugardiorum*, this species has similar short adpressed hairs, dark brown at the base, on the calyx. Similar hairs, but with a considerable production below the point of attachment occur on the stem, on both surfaces of the leaf and on the pod. It is in this remarkable character, which in African *Leguminosae* is otherwise confined to *Indigofera*, *Rhynchotropis* and some species of *Lotononis*, that *C. miranda* differs from all other known species of *Crotalaria*, and the epithet '*miranda*' meaning 'strange, singular' has consequently been chosen for it. The other characters in which *C. miranda* differs from *C. lugardiorum* are given in the diagnosis above.

It is often the case in *Crotalaria* that two closely allied species are separated ecologically as well as geographically. *C. miranda* is a plant of the deciduous woodlands. It has been found between 1350 and 1740 m. in western Tanganyika and around Abercorn in Northern Rhodesia. *C. lugardiorum* is normally a plant of upland grasslands in the mountainous districts of Uganda and Kenya, where it occurs between 1550 m. and 2300 m. It rather frequently becomes a weed of cultivation and in this unnatural habitat descends to 1100 m. The most southern record of *C. lugardiorum*, from the Ngara District of Tanganyika, is north of the most northern record of *C. miranda*.

Crotalaria gweloënsis (*Bak. f.*) *Milne-Redh.*, stat. nov.

C. sericifolia Harms var. *gweloënsis* Bak. f. in Journ. Linn. Soc., Bot. 42: 398 (1914); Verdoorn in Bothalia 2: 385 (1928).

This taxon, known to E. G. Baker from a single gathering only, is now represented at Kew by over a score of specimens from Southern and Northern Rhodesia, Nyasaland and southern Tanganyika. It is, in the writer's opinion, clearly distinct from *C. sericifolia* on account of its larger leaflets and distinctly petiolate leaves. *C. gweloënsis*, through most of its range of

distribution, has leaflets which are glabrous on the upper surface. However, in parts of Northern and Southern Rhodesia plants occur with silky hairs on the upper surface. There are also specimens with the upper surface glabrous apart from a few silky hairs on the lower half of the midrib; in view of this it is considered inadvisable to give the more hairy taxon a varietal name.

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Horticultural pests.*—Practical gardeners, horticultural advisers and students have all had cause to be grateful to the late George Fox Wilson for the two editions of 'The Detection and Control of Garden Pests' which appeared in 1947 and 1949. Rapid developments in the field of insect control since then have made a revision of this useful book most desirable, and doubtless the author would have produced this but for his untimely death in 1951. Dr. P. Becker who has succeeded Mr. Fox Wilson as entomologist to the Royal Horticultural Society has now produced a third edition under a shorter and more accurate title.

Although giving the latest recommendations for the control of pests by chemicals, Dr. Becker is rightly cautious about their indiscriminate use and stresses the value of cultural, physical, mechanical and biological control in certain cases.

Besides bringing the book up-to-date, Dr. Becker has managed to increase its contents very considerably without adding to its size, but the new edition follows closely the very practical arrangement of the earlier editions. Further illustrations, some in colour, have been added to assist in the identification of pests by the damage they produce. A chapter on lawns and five appendices have been added, and more detail has been given in the host plant and pest indices, making it far easier and quicker to find the reference wanted. The stout cover fits a book which is likely to be used in a potting shed as much as in a library.

J. SOUSTER

* *Horticultural Pests.* Detection and control. By G. Fox Wilson. Revised edition by P. Becker. Pp. 240, 144 text-figures (mainly half-tone), 4 colour plates (13 figures) and a portrait frontispiece. London: Crosby Lockwood & Son Ltd., 1960. Price £1 5s.

Babiana.*—This book of 149 pages, with 10 photographs and 23 colour and half-tone plates by the author, is an essay in the revision of an iridaceous genus in which most previous authors have made numerous and considerable errors in both identification and nomenclature. Dr. Lewis has described no fewer than 61 species, divided into six sections; many species are new, and some are further divided into named infraspecific units.

Dr. Lewis' taxonomy, so far as one can judge without long test, is excellent; her keys employ well-contrasted characters which give confidence that they will work easily in this difficult genus. Her nomenclature, however, is not so good. In particular, her citations of literature give no distinction between misidentifications and homonyms, and the author citation 'Thunb. non Linn.' may represent either, whilst the question 'Which part?' remains unanswered when 'Thunb. p.p.' is cited. The type-species of the genus is cited as *B. plicata* Ker, and although this is true the name is illegitimate because the epithet '*fragrans*', from *Gladiolus fragrans* Jacq. was available to Ker at the time of publication. It is irrevelant that Ker also cited *G. plicatus* Thunb. and *G. plicatus* Jacq. since these, whether independently described or not, were either misidentifications or later homonyms of *Gladiolus plicatus* (Linn.) Linn. which is another species. From the synonymy given by Dr. Lewis, it would appear that the taxonomically correct name of the type species is *Babiana disticha* Ker, since *B. fragrans* is now preoccupied. Under *Babiana stricta* (Ait.) Ker, Dr. Lewis has cited 'Bot. Mag. t. 621 (1802)' as lectotype, an error in understanding of the term lectotype, for the name is based upon *Gladiolus strictus* Ait., Hort. Kew. 1: 63 (1789).

Despite such faults, however, this revision will be a standard work for a generation or more; it should do much to persuade horticulturists to grow more of these very charming plants, and will encourage field workers to pay more attention to them and still further to elucidate the many problems of inter- and intra-specific variation which remain.

The book is well produced, typographic errors are few, and the illustrations are very good indeed.

A. A. Bullock

Greenhouse management.†—The maintenance and management of greenhouses are dealt with in this book which contains chapters dealing with heating, ventilation, potting composts, seed sowing, cuttings, propagators, watering, and pest and disease control. The basic principles of greenhouse management are clearly explained accompanied by many photographs and line-drawings.

H. S. Marshall

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* *The Genus Babiana.* (Journal of South African Botany, Supplementary Volume 3). By G. J. Lewis. Pp. 149, 8 colour plates, 25 half-tone plates. Kirstenbosch: Trustees of the National Botanic Gardens, 1959. Price £2 2s.

† *Greenhouse management.* 'Amateur Gardening' Picture Book No. 10. By J. P. Wood. Pp. 60, over 130 photographs and line-drawings. London: W. H. & L. Collingridge Ltd., 1959. Price 7s. 6d.